J. Soil Sci. and Agric. Eng., Mansoura Univ., Vol. 7 (5): 3٣٥ – 3٤٤,2016

Effect of Organic and Bio-Fertilization as Partial Substitute for Mineral Nitrogen Fertilization on Wheat Plants

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ABSTRACT

A field experiment was conducted during two successive winter growing seasons of (2012/ 2013 and 2013/ 2014) at the experimental farm of Mallawi Agricultural Research Station, Mallawi center, EL- Minia Governorate, Egypt. The objective of this research was to study the effect of applying different levels of inorganic nitrogen (0, 50, 75 and 100% N fed^{-1} from RD 75kg N fed^{-1}) and organic fertilization (0, 5 and 10 ton fed^{-1}) and inoculation with *Azospirillum brasilenes* as well as their interactions on number of bacteria yield, yield quality, and nitrogen content and uptake by wheat plants cultivar (Beni suef one) grown in silty clay loam soil. The results showed that increasing the level of mineral nitrogen fertilization from 0, 50, 75 and 100% N fed^{-1} from RD of nitrogen (75kg N fed^{-1}) resulted in a significant increase in all studied parameters (1000 grain weight, grain yield, straw yield, protein percentage in grains, N content in grain and straw, nitrogen uptake by grain, nitrogen uptake by straw and total nitrogen uptake by grain and straw except number of *Azospirillum brasilenes* per gram soil was not significant. All studied parameters were significantly increased due to increasing the level of organic fertilizer from 0 to 5 ton fed^{-1} or 10 ton fed^{-1} except nitrogen uptake by the grains in the first season was not significantl. Inoculation of wheat plants with *Azospirillum brasilenes* resulted in a significant increase in number of *Azospirillum brasilenes* per gram soil, 1000 grain weight, N content in grain in the second season, N content in the straw, nitrogen uptake by grain in the first season, total nitrogen uptake in the second season and protein percentage in the second season only, While, results was not significant increase in grain and straw yields, N content in grain in the first season, nitrogen uptake by grain in the second season, nitrogen uptake by straw, total nitrogen uptake in the first season and protein percentage in grain in the first season. The highest values of studied parameters were obtained when wheat plants were fertilized with mineral nitrogen fertilizer at the rate of 75% from RD of nitrogen (75kg N fed^{-1}) combined with 10 ton fed^{-1} organic fertilizer and inoculated with *Azospirillum brasilenes*. The effect of the interactions between the three studied factors on most the studied parameters was significant increase except the number of *Azospirillum brasilenes* per gram soil, grain yield in second season, straw yield in the second season, nitrogen uptake by grain in the second season and nitrogen uptake by straw in the second season and total nitrogen uptake in the second season was not significant. The results indicated that application of mineral nitrogen fertilizer at the rete 56.25 kg N fed^{-1} (75% from RD 75 kg N fed^{-1}) combined with organic fertilizer at rate 10 ton fed^{-1} to the silty clay loam soil cultivated with wheat plant and inoculation with *Azospirillum brasilenes* improved quantity and quality of wheat yields.

Keywords: wheat – inoculation *Azospirillum brasilenes* - mineral nitrogen fertilizer- organic fertilizer - composted crop residues CCR

INTRODUCTION

Wheat (*Triticum aestivum L.*) is considered the most strategic food crop for more than 700 years in Egypt. It has maintained its position as the basic staple food in urban areas, where it mixed with maize grain in rural areas for bread production. In addition, wheat straw is an important animal fodder (Gomaa, 1999). Any effort made to reduce the gab between wheat production and consumption, is highly appreciated. Fathi *et al* ., (2003) indicated that N increases the nutrients uptake, capacity of photosynthesis assimilation in building metabolites, its translocation and accumulation in the sink, although crop productivity can be enhanced by N fertilization and decrease complex cropping sequences, these practices may strongly interact and impact soil properties differently Russell *et al*., (2006). Ahmed and Hassouna, (2010) reported that the increase in N fertilizer level from 25 to 50 and 75 kg N fed^{-1} Led to significant increases in 1000 grain weight, grain and straw yields, protein content of grain, N% in grain and straw and N uptake by grain and straw for wheat plants. Hemeid Nadia and Ali, (2010) indicated that wheat grain and straw yields were significantly increased by increasing N level. The favorable effect of nitrogen fertilization on wheat production and protein content in grains were reported by Morsy *et al*. (1999), Attallah *et al*. (2004), Mekail *et al*., (2005) and Azer and Sadek (2007) who found that grain yield of wheat and grain N content had positively responded to high N level. Raising N fertilizer up to 75 kg N/ fed increased 1000-grains weight, grain and straw yield as well as grain protein content Hamid (1998) and Adel *et al*., (2000),who found that a significant increases were occurred up to 75 kg N/ fed Also Abido (2002), Zeidan (2003) and El-Zeky (2005) indicated that increasing N rates led to increased 1000-grains wheat (g) grain and straw yields, nitrogen uptake by grain and straw as well as protein content. Plant growth depends on an adequate supply of nitrogen (N) in order to synthesize the amino acids, protein, nucleic acids and other cellular constituents necessary for plant development Esteban *et al*., (2004).

Biofertilizer like *Rhizobium*, *Azotobacter*, *Azospirillum* and blue green algae have been used for many years. *Azospirillum* inoculants are recommended mainly for wheat, sorghum, millets, maize, sugarcane and vegetable crops. Plant growth promoting *rhizobacteria* are free living microorganisms having beneficial effects on plants by colonizing their roots. They include such effects as the production of phytohormones; auxin, cytokinins and gibberellins (Garcia et al., 2001). El- kouny (2007) indicated that yield and its components, straw yield and grain yield as well as crude protein, phosphorus and potassium percentage in wheat grain significantly increased due to mineral and / or organic manure (compost) as well as bio- fertilizers treatments. Ahmed and Hassouna,(2010)

indicated that the inoculation of wheat plants with mixed strains of *Azospirillum brasilenes* and *Bacillus polymuxa* resulted in a significant increase 1000 grain weight, grain and straw yields, protein content of grain, N content in both grains and straw (%) and N uptake by grain and straw. enhancing release of the nutrients (Amanullah *et al* 2012).

Recently, increasing attention have lead to search other avenue of biofertilizers with multipurpose activities as a manner of sustainable soil health to improve the plant productivity. *Azotobacte*r have been universally accepted as a major inoculum used in biofertilizer to restore the nitrogen level into cultivated field (Samiran, 2012). Bacteria of the genera *Azotobacter* and *Azospirillum* are free-living, N_2-fixing organisms, which live in close association with plant roots. These kind of plant bacterial interaction often results in plant growth-promotion (Rodelas *et al.,* 1997).

The farmers usually use excessive amount of chemical fertilizers to maximize their yields. On the other hand, most of mineral N is a potential pollution by NO_3 losses in ground water, which affected human and animal health (Sarhan *et al.*,2002), so sustainable farming such as organic manures or using composed crop residues in agriculture is considered to be a strategy to preserve the environment and present pollution. The addition of such materials is one of fundamental processes to minimize the nutrients lost in soil by means of leaching and denitrification as well as imporove the physical, nutritional and biological properties (Akalan, 1983). Awad and Turkey (2007) concluded that the treatments of three composts (sugar beet havlms, flax shivers and rice straw) significantly stimulated the accumulation of N and K in wheat shoots compared to control treatment. Hemeid Nadia and Ali, (2010) reported that nitrogen percentage and uptake in wheat grain and straw as well as total N uptake and crude protein content in grains were significantly increased by application of compost for nitrogen fertilizer. Organic compost addition was found to not only increase crop yield, but also to improve soil fertility in terms of organic C and N content, permeability, plant available water capacity and air-filled porosity Moncrief, (1998) and Keener,(2000). Organic manure and chemical fertilization increased soil nutrients and microbial biomass. Application of organic manures significantly increased levels of organic C and N and the formation of water-stable aggregates, as compared with application of chemical fertilizers Adrien, (2006). Chauhan *et al.*, (2011) found that the combined application of *Azospirrillum* and *Aztobacter* significantly increases the spikes, No. of tillers, grain wheat, grain size, spike let per plants, spike length, therefore the use of 75% mineral nitrogen and biofertilizer with *Azospirrillum* and *Aztobacter* increases all the growth character in wheat Mohammed *et al.,* (2012) reported that the yield of maize was obtained maximum when 25% poultry manure + 75 % mineral nitrogen ; due to this 1000 grain weight was high due to application of poultry manure and mineral nitrogen.

Fariha Noreen and Sadia Noreen (2014). Indicated that the combined use of farmyaed manure, chemical fertilizer and biofertilizer has beneficial effect on crop plants.

The objectives of this study were to Reducing the mineral fertilization using Bio and Organic fertilizers on wheat yield and its components as well as N% and N uptake of wheat grain and straw, also, the protein content in wheat grains.

MATERIALS AND METHODS

A field experiment was carried out at Mallawi Agric. Res. St., A.R.C., Minia Governorate, Egypt, during the two successive winter seasons of 2012/ 2013 and 2013/ 2014 in silty clay loam soil to study Reducing the mineral fertilization using Bio and Organic fertilizers and its impact on the wheat crop, (Wheat variety Beni Suef one).

A split- split plot design with three replicates was used The main plots were devoted to the two Bio-fertilizers. i.e., un-inoculated and inoculated wheat seeds with *Azospirillum brasilenes* was supplied by Microbiology Dept., Soils, Water, and Environment Research Institute, A..R.C.,Giza, Egypt, For preparation of *Azospirillum brasilenes* inocula, nutrient agar medium (Dobereiner, J. and Day, J.M., 1976) were inoculated with *Azospirillum brasilenes*, and incubated at 30ºC for 7 days till the number of bacteria reached about 1×10^8 cell /ml and then, the inocula were used for inoculation of seeds. Microbes were counted after 45 days from sowing. The subplots were assigned to the three organic fertilizer levels i.e, 0, 5 and 10 ton fed^{-1} The sub-subplots were allocated to four nitrogen fertilizers levels, i.e., 0,50,75 and 100 % RD N fed^{-1} plot area 3×3.5 m^2 (1\ 400 fed) and wheat grains were sown at rate of 60 kg fed^{-1} on fourth week of November in 2012/2013 and 2013/2014, respectively. Nitrogen fertilizer as NH_4NO_3 was added 0,50,75 and 100% N fed^{-1} at RD (75kg N fed^{-1}) in two equal doses , the first and the second before the sub- sequent irrigation . Phosphorus fertilizer was side-dressed after ridging planting at the rate of 150 kg calcium super phosphate (15.5 % P_2O_5) .Potassium fertilizer side-dressed before the second irrigation according to the treatments rate. Some physical and chemical properties of the surface layer (0.0 - 30 cm) of the soil at the start of each growing seasons surface soil samples were collected dried, sieved prior to laboratory analysis according to Piper (1950), Jackson (1973) and Black, *et al.,* (1965). Some main soil chemical, and fertility characteristics are presented in Table (1) ,Also, sample of CCR was subjected to laboratory analysis are show in Table (2) .

Table (1). Some physical and chemical properties of the experimental soil (before sowing).

Properties	2012/2013	2013/2014
Texture analysis		
Sand (%)	7.75	8.30
Silt (%)	53.70	53.40
Clay (%)	38.55	38.30
Soil texture	Silty clay loam	Silty clay loam
Organic matter (%)	1.14	1.14
pH soil – water suspension ratio (1:2.5)	8.15	8.25
EC(dsm-1)soil-water extract ratio (1:5)	1.26	1.22
Soluble cations (meq/L)		
Ca^{++} (meq/L)	7.45	7.25
Mg^{++} (meq/L)	2.15	2.10
Na^{+} (meq/L)	3.22	3.20
K^{+} (meq/L)	0.20	0.18
Soluble anions (meq/L)		
CO_3^{--} (meq/L)	---	---
HCO^{-} (meq/L)	3.20	3.18
Cl^{-} (meq/L)	4.10	4.15
SO_4^{--} (meq/L)	5.72	5.40
Available N (ppm)	18.25	18.15
Available P (ppm)	7.58	7.76
Available K (ppm)	156.00	155.00

Table (2): Some characteristics of composted crop residues (CCR)

Properties	OM (%)	Organic carbon (%)	pH soil – water suspension ratio (1:10)	E.C soil- water extract (1:10) .(dS/m\1)	C:N	Total macronutrients (%)			Total micronutrients (ppm)			Weight of one m^3 (kg)
						N	P	K	Zn	Fe	Mn	
Values	32.75	19.25	7.85	6.9	11.6:1	0.87	0.22	0.85	54	810	204	500

At harvest, grain and straw yields were determined after threshing by harvesting $4m^2$ for each replication. Grain and straw samples were dried in a forced oven at 70°c till constant of weight; ground to a fine powder and sub sample of 0.2 gm was wet digested using sulphuric-perchloric acid mixture (1:1) as described by A.O.A.C (1995), to determine the total N, P and K in the acidic extract as follows:

A- Physical analysis:

Mechanical analysis was determined according to international pipette method as described by Piper (1950).

B- Chemical analysis:

- Soil pH was determined in the suspension of soil sample (1:2.5, soil: water) according to United States Salinity Laboratory Staff (Richards, 1954).
- The electrical conductivity (EC) was measured by an electrical conductivity meter in the soil extract (1:5, soil: water) (dsm^{-1}) [United States Salinity Laboratory Staff (Richards, 1954)].

C- Chemical composition of straw and grain:

- Samples of the straw and grain were ground to a fine powder and sub samples of 0.2 gm were wet digested using sulphuric-perchloric acid mixture (1:1) as described by A.O.A.C, (1995), to determine the total N, P and K in the acidic extract as follows:
- Total nitrogen (%) was determined by Kjeldahl method according to Jackson, (1967).
- Total phosphorus (%) was estimated colorimetrically using the chlorostannus-reduce molybdo phosphoric blue color method and measured at the wave length of 640 nm using spectrophotometer as described by Jackson, (1967).
- Total Potassium (%) was determined using the flame photometer as described by Jackson, (1967).
- Crud protein percent in Wheat grains were calculated by multiplying N% by 5.7 according to Tripath *et al.*, (1971).

Statistical analysis:

Data were subjected to appropriate statistical analysis as described by Snedecor and Cochran, (1980). Treatments means were compared by L.S.D. tese.

RESULTS AND DISCUSSION

Number of *Azospirillum brasilenes* per gram soil

The number of *Azospirillum brasilenes* per gram soil at 60 days after planting as affected by application of inorganic nitrogen, organic fertilizer and inoculation with *Azospirillum brasilenes* during the two growing seasons were illustrated in Table (3).

Effect of inoculation:

It appears from Table (3) that inoculation of wheat seeds with *Azospirillum brasilenes* at planting significantly increased the number of *Azospirillum brasilenes* per gram soil. (P=0.05) compared with those of uninoculated treatments in the two growing seasons. These results coincide with findings of other researchers (Samiran , *et al.*, 2012 and Rodelas, *et al.*, 1997).

Effect of organic fertilization

Number of *Azospirillum brasilenes* per gram soil was significantly increased (P =0.05) when the level of organic fertilization increased from 0, 5 and 10 ton fed^{-1} compared with those of unfertilized plants in the two growing season

Table (3): Effect of inorganic, organic and bio-fertilization and their interactions on Number of *Azospirillum brasilenes* per gram soil and 1000 grain weight (g) of wheat

A	B	Number of *Azospirillum brasilenes* per gram soil										1000-grain weight(g)									
		Season 1					Season2					Season 1					Season2				
		C1	C2	C3	C4	meam	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean
	B1	5.93	2.23	3.10	3.63	3.73	5.93	٢.47	3.10	3.50	3.٧٥	43.87	50.67	51.80	58.47	51.2	45.83	51.53	52.83	59.53	52.43
A1	B2	3.47	4.03	4.47	4.6	4.14	3.40	4.60	4.60	4.70	٤.٣٣	50.90	54.03	58.50	60.27	55.93	51.60	54.07	58.67	60.33	56.17
	B3	4.47	4.6	4.7	3.97	4.43	4.30	4.60	4.67	4.10	٤.٤٢	51.90	57.80	59.63	63.00	58.08	51.83	57.50	59.50	63.15	57.99
Means		4.62	3.62	4.09	4.067	4.1	٥.٨٨	٣.٨٩	٤.١٢	٤.١٠	٤.٥٠	48.89	54.17	56.64	60.58	55.07	49.76	54.37	57.00	61.01	55.53
	B1	6.93	8.9	9.07	8.93	8.46	8.33	9.03	9.23	9.03	٨.٩١	49.30	52.97	55.50	60.13	54.48	49.50	53.00	56.17	60.33	54.75
A2	B2	12.57	13.13	13.7	12.47	12.97	12.40	12.77	12.57	11.97	١٢.٤٣	51.77	54.77	60.20	65.17	57.98	52.00	55.00	60.33	65.57	58.23
	B3	14.27	14.17	14.47	14.33	14.31	13.97	13.83	14.40	13.87	١٤.٠٢	54.30	58.10	66.33	64.80	60.88	54.40	59.00	66.60	65.03	61.26
Means		11.26	12.07	12.41	11.91	11.91	١١.٥٧	١١.٨٨	١٢.٠٧	١١.٦٢	١١.٧٨	51.79	55.28	60.68	63.37	57.78	51.97	55.67	61.03	63.64	58.08
Average of B	B1	6.43	5.57	6.08	6.28	6.09	7.13	٥.٧٥	٦.١٧	٦.٢٧	٦.٨٣	46.58	51.82	53.65	59.3	52.84	47.67	52.27	54.50	59.93	53.59
	B2	8.02	8.58	9.08	8.53	8.55	٧.٩٠	٨.٦٨	٨.٥٦	٨.٣٣	٨.٣٨	51.33	54.40	59.35	62.72	56.95	51.80	54.53	59.50	62.95	57.20
	B3	9.37	9.38	9.58	9.150	9.37	٩.١٣	٩.٢٣	٩.٥٣	٨.٩٨	٩.٢٢	53.10	57.95	62.98	63.90	59.48	53.12	58.25	63.05	64.09	59.63
Over all		7.94	7.84	8.25	7.99	8.01	٨.٧٢	٧.٨٨	٨.٠٩	٧.٨٦	٨.١٤	50.34	54.72	58.66	61.97	56.43	50.86	55.02	59.02	62.33	56.80
L S D 5%	A	1.8548					2.8792					0.5488					0.4905				
	B	0.9265					1.900					0.1621					0.2785				
	C	NS					NS					0.2667					0.3092				
	AB	1.3103					2.6869					0.2292					0.3936				
	AC	NS					NS					0.3768					0.4372				
	BC	NS					NS					0.4616					0.5354				
	ABC	NS					NS					0.6527					0.7573				

A= Bio-fertilizers A1 = un-inoculated A2 = inoculated B= Organic fertilizers B1 = 0 ton fed^{-1} B2 = 5 ton fed^{-1} B3= 10 ton fed^{-1} C = nitrogen fertilizer C1= 0 % RD N fed^{-1} C2= 50% RD N fed^{-1} C3 =75% RD N fed^{-1} C4= 100 % RD N fed^{-1}

Effect of mineral nitrogen fertilization

It is obvious that increasing the level of nitrogen fertilization from 0, 50, 75 to 100% (RD) of recommended rate (75kg N fed^{-1}) was not significantly affected in the two growing seasons.

The highest values of the number of *Azospirillum brasilenes* per gram soil (14.47 and 14.40)×10^{8} was obtained when wheat plants were fertilized with 10 ton organic fertilization combined with 75% RD and inoculated with *Azospirillum brasilenes* in the first and second growing seasons, respectively.

Effect of interactions:.

The effect of the interactions between the three studied factors (inoculation × organic fertilizer), (inoculation × nitrogen), (organic × nitrogen) and (inoculation × organic ×nitrogen) on the number of *Azospirillum brasilenes* per gram soil. was not significant (P= 0.05 in the two growing seasons except the effect of the interactions between inoculation ×organic on the number of *Azospirillum brasilenes ococcum* per gram soil was significant increased in the two growing seasons.

1000 grain weight (g) of wheat

The effect of three factors (nitrogen fertilization, organic and inoculation) and their interactions on average of 1000 grain weight of wheat during in the two growing seasons are presented in Table (3).

Effect of organic fertilization inoculation:

It was observed that 1000 grain weight (gm) of wheat was significantly increased by organic fertilize application in the two growing seasons. Also the effect of inoculation with *Azospirillum brasilenes* was significantly increased in 1000 grain weight of wheat in the first and second seasons.

These results are In line with those obtained by Ahmed and Hassouna (2010) and Amanullah et al., (2012).

Effect of mineral nitrogen fertilization.

The obtained results reveal that there was a significant increase for 1000 grain weight (gm) in two growing seasons with increasing level of nitrogen fertilization from 50%, 75% and 100% from the recommended rate N(75kg N/fed.) compared with those of unfertilized treatments in the two growing seasons. Similar results were obtained by Abido (2002) and El-Hadidi et al., (2002).

Effect of interactions:.

The effect of interactions between the three studied factors (inoculation × organic fertilizer, inoculation × nitrogen, organic × nitrogen and inoculation × organic ×nitrogen) on 1000 grain weight of wheat were significantly increased in the two growing seasons.

Grain and straw yields :

Table (4) demonstrated that grain and straw yields of wheat plants

Effect of inoculation:

It can be observed from the results shown in Table (4) that inoculation of wheat plants with *Azospirillum brasilenes* were increased grain and straw yields positively but insignificantly in the two growing seasons.

Effect of organic fertilization

Table (4) demonstrated that grain and straw yields of wheat plants were increased with increase the level of organic fertilizer from 5 and 10 ton fed^{-1} significantly (P= 0.05) when compared with those of

unfertilized plants in the two growing seasons. The increment of grain yield increased reached to 9.10, 13.54% and 5.04, 10.79% in the first and second seasons respectively. The corresponding increases in straw yield were 12.41, 23.31% and 5.00, 10.95% as compared with non-organic fertilization treatment. The beneficial effects of organic fertilization application reflected in supplying N and increasing availability of P and K as well as organic acids.

Table (4): Effect of inorganic, organic and biofertilization and their interactions on Grain yield (ton fed^{-1}) and Straw yield (ton fed^{-1}) of wheat.

A	B	Grain yield (ton fed^{-1})										Straw yield (ton fed^{-1})									
		Season 1					Season2					Season 1					Season2				
		C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	Mean	C1	C2	C3	C4	Mean
A1	B1	1.950	2.640	2.648	2.889	2.532	3.001	3.097	3.215	3.265	3.144	5.657	4.560	4.086	4.078	4.595	5.333	5.503	5.718	5.801	5.589
	B2	2.499	3.086	3.456	3.000	3.010	3.219	3.408	3.383	3.419	3.357	4.602	5.401	5.103	5.820	5.232	5.715	6.059	6.020	6.060	5.963
	B3	2.44	2.95	3.197	3.78	3.092	3.311	3.527	3.883	3.503	3.556	4.650	5.815	6.311	6.501	5.820	5.889	6.273	6.651	6.097	6.228
Means		2.296	2.892	3.10	3.223	2.878	3.177	3.344	3.494	3.396	3.353	4.970	5.259	5.167	5.469	5.216	5.646	5.946	6.130	5.986	5.927
A2	B1	2.432	2.629	3.051	3.681	2.948	3.048	3.436	3.447	3.371	3.326	4.158	5.223	5.065	5.854	5.508	5.419	6.075	6.185	5.709	5.847
	B2	2.443	2.778	3.436	3.216	2.968	3.264	3.383	3.579	3.527	3.438	4.269	4.871	4.749	6.120	5.002	5.803	6.017	6.021	6.340	6.045
	B3	2.547	3.221	3.531	3.219	3.129	3.362	3.626	3.77	3.693	3.613	4.853	5.180	5.871	5.715	5.405	6.116	6.441	6.703	6.574	6.460
Means		2.474	2.876	3.339	3.372	3.015	3.225	3.482	3.599	3.530	3.459	4.427	5.091	5.228	5.473	5.055	5.779	6.177	6.304	6.208	6.117
Average of B	B1	2.191	2.635	2.850	3.285	2.740	3.025	3.266	3.331	3.318	3.235	4.908	4.892	4.576	5.832	4.552	5.376	5.789	5.951	5.755	5.718
	B2	2.471	2.932	3.446	3.108	2.989	3.242	3.396	3.481	3.473	3.398	4.436	5.136	4.926	5.970	5.117	5.759	6.038	6.020	6.200	6.004
	B3	2.494	3.086	3.364	3.500	3.111	3.337	3.577	3.826	3.598	3.584	4.752	5.498	6.091	6.108	5.613	6.603	6.357	6.679	6.336	6.344
Over all		2.385	2.884	3.220	3.298	2.947	3.201	3.413	3.546	3.463	3.406	4.699	5.175	5.198	5.470	5.136	5.712	6.061	6.217	6.097	6.022
L S D 5 %	A	NS					NS					NS					NS				
	B	0.2478*					0.0597					0.6170					0.2338				
	C	0.1576					0.1350					06678*					0.1120				
	AB	0.3503*					NS					NS					NS				
	AC	0.2230*					NS					NS					NS				
	BC	0.2730					NS					1.1570*					NS				
	ABC	0.3861					NS					1.6361*					NS				

A= Bio-fertilizers A1 = un-inoculated A2 = inoculate B= Organic fertilizers B1 = 0 ton fed^{-1} B2 = 5 ton fed^{-1} B3= 10 ton fed^{-1} C = nitrogen fertilizer C1= 0 % RD N fed^{-1} C2= 50% RD N fed^{-1} C3 =75% RD N fed^{-1} C4= 100 % RD N fed^{-}

Effect of mineral nitrogen fertilization.

Data in table (4) showed that grain and straw yields of wheat plants were significantly increased (p= 0.05) with increasing the level of nitrogen fertilization from, 50, 75 and 100% from the recommended rate (75kg N fed^{-1}) compared with those of unfertilized plants in the two growing seasons. Sush increments might be attributed to the favorable role of nitrogen in encouraging metabolic processes in wheat plants, consequently improving yield components. Similar results were obtained by Abido (2002) and El- Hadidi et al., (2002) who indicated that increasing N fertilizer rate up to full recommended does (75 kg N fed^{-1}) increased significantly grain and straw yield. These results are in accordance with those reported by El-Zeky (2005) and Mohammed et al., (2012).

Effect of interactions.

The effect of interactions between (inoculation × organic fertilizer and inoculation × inorganic nitrogen on grain and straw yields was not significant (P = 0.05) in the two growing seasons, except grain yield (ton fed^{-1}) in the first season only, Also the effect of interactions between organic fertilizer × inoculation and inoculation × organic fertilizer × inorganic nitrogen on grain in the first season and on straw yield in the second season were significantly increased, while the grain and straw yields in the second season were not significant (P=0.05). The results were in agreement with Chauhan et al., (2011) and Fariha Noreen and Sadia Noreen (2014).

In general, application of inorganic N and organic fertilizer to the soil cultivated with wheat plants is important for increasing grain and straw yields.

N content in grain and straw

Data in Table (5) showed the effect of individual treatments or when used together on N content in grain and straw during the two successive grasing seasons.

Effect of inoculation:

Wheat plants inoculation with *Azospirillum brasilenes* increased nitrogen content in grains and straw compared to those of uninoculated plants in both season, this increase was significant except N% in grains in the first season was not significant. Similar results were also obtained by Ahmed and Hassouna (2010) and Samiran and Gauri (2012).

Effect of organic fertilization

It is note that the application of organic fertilizer at rate of 5- 10 ton fed^{-1} resulted in significant increases for each of nitrogen content of grains and straw compared to the control treatment (no addition of organic fertilizer) during the two growing seasons.

These results are in agreement with those obtained by Akalan, (1983) and Awad and Turkey (2007).

Effect of mineral nitrogen fertilization.

Data also reveal that N- content in wheat grains and straw showed significant increas as a result of different applied nitrogen levels (0, 50, 75 and 100% N fed^{-1}) during the two growing seasons. This significant effect may be related to the increase in dry matter accumulation under the encouragement of increasing N level as stated by Ibrahim (1997), Abdel – Ghani and Bakry (2005). Showed that N content in grain and straw significantly increased with increasing N- mineral rates up to 90kg fed^{-1}

Effect of interactions:.

Data presented in the same Table (5) showed the

effect of the interactions between the three studied factors on N content in grain and straw significantly increased in the two growing seasons, except the interactions between organic fertilizer × mineral nitrogen fertilizer was not significant increase in N content in grain in the first season only. These results are consistent with the previously reported results by Fariha Noreen and Sadia Noreen (2014).

Table (5): Effect of inorganic, organic and biofertilization and their interactions on N content in grain and straw.

A	B	N% in grain										N% in Straw									
		Season 1					Season2					Season 1					Season2				
		C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean
A1	B1	1.12	1.17	1.21	1.24	1.19	1.12	1.20	1.22	1.24	1.19	0.323	0.384	0.407	0.419	0.383	0.324	0.392	0.408	0.424	0.387
	B2	1.17	1.21	1.23	1.26	1.22	1.17	1.21	1.24	1.27	1.22	0.388	0.402	0.417	0.426	0.408	0.394	0. 404	0.417	0.427	0.410
	B3	1.27	1.30	1.32	1.32	1.30	1.28	1.32	1.32	1.33	1.31	0.402	0.416	0.421	0.428	0.417	0.405	0.418	0.422	0.429	0.418
Means		1.19	1.23	1.25	1.27	1.23	1.19	1.24	1.26	1.28	1.24	0.371	0.401	0.415	0.424	0.403	0.374	0.405	0.416	0.426	0.405
A2	B1	1.18	1.21	1.24	1.25	1.22	1.21	1.22	1.25	1.26	1.23	0.391	0.404	0.416	0.422	0.408	0.393	0.406	0.417	0.424	0.418
	B2	1.19	1.22	1.25	1.23	1.22	1.22	1.24	1.26	1.28	1.25	0.403	0.414	0.421	0.425	0.416	0.404	0.415	0.422	0.426	0.417
	B3	1.22	1.25	1.32	1.28	1.27	1.27	1.29	1.33	1.30	1.30	0.410	0.421	0.427	0.434	0.423	0.411	0.422	0.426	0.434	0.424
Means		1.19	1.23	1.27	1.25	1.24	1.23	1.25	1.28	1.28	1.26	0.401	0.413	0.421	0.427	0.416	0.403	0.414	0.423	0.428	0.417
Average of B	B1	1.15	1.20	1.22	1.24	1.20	1.16	1.21	1.23	1.25	1.21	0.357	0.394	0.412	0.420	0.396	0.358	0.399	0.413	0.424	0.398
	B2	1.18	1.22	1.24	1.24	1.22	1.20	1.22	1.29	1.27	1.23	0.395	0.408	0.419	0.425	0.412	0.399	0.409	0.420	0.426	0.414
	B3	1.25	1.27	1.32	1.30	1.29	1.28	1.30	1.33	1.31	1.31	0.406	0.418	0.424	0.431	0.420	0.408	0.420	0.425	0.432	0.421
Over all		1.19	1.23	1.26	1.26	1.24	1.21	1.25	1.27	1.28	1.25	0.386	0.407	0.418	0.425	0.409	0.366	0.410	0.419	0.419	0.411
L S D 5 %	A	NS					0.0037					0.0012					0.0018				
	B	0.0130					0.0023					0.0016					0.0010				
	C	0.0121					0.0017					0.0026					0.0026				
	AB	0.0186					0.0033					0.0026					0.0016				
	AC	0.0172					0.0023					0.0034					0.0037				
	BC	NS					0.0029					0.0043					0.0043				
	ABC	0.0299					0.0040					0.0060					0.0063				

A= Bio-fertilizers A1 = un-inoculated A2 = inoculate B= Organic fertilizers B1 = 0 ton fed^{-1} B2 = 5 ton fed^{-1} B3= 10 ton fed^{-1} C = nitrogen fertilizer C1= 0 % RD N fed^{-1} C2= 50% RD N fed^{-1} C3 =75% RD N fed^{-1} C4= 100 % RD N fed^{-1}

Nitrogen uptake (kg fed^{-1}) by grain and straw:

Data presented in Table (6) showed that the nitrogen uptake (kg fed^{-1}) both grain and straw as affected by different treatments and their interactions during two growing seasons.

Effect of inoculation:

Effect of inoculation of wheat plants with *Azospirillum brasilenes* on nitrogen uptake (kg fed^{-1}) by grain and straw was not significantly increased in the two growing seasons, except nitrogen uptake (kg fed^{-1}) by grain in the first season only, was significant increased compared to those of uninoculated treatments.

Table (6): Effect of inorganic, organic and biofertilization and their interactions on nitrogen uptake (kg fed^{-1}) in wheat grain and straw.

A	B	N uptake in grain(kg fed^{-1})										N uptake in Straw (kg fed^{-1})									
		Season 1					Season2					Season 1					Season2				
		C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean
A1	B1	21.84	30.89	32.04	35.82	30.13	33.61	37.16	39.22	40.49	37.41	18.27	17.51	16.63	17.09	17.60	17.27	21.57	23.33	24.60	21.63
	B2	29.24	37.34	42.51	37.8	36.72	37.66	41.24	41.95	43.42	40.96	17.86	21.71	21.28	24.80	21.35	22.52	24.48	25.10	25.88	24.45
	B3	30.99	38.35	42.20	49.90	40.20	42.38	46.56	51.26	46.59	46.58	18.69	24.19	26.57	27.82	24.27	23.85	26.22	28.07	26.16	26.03
Means		27.32	35.57	38.75	40.93	35.40	37.81	41.47	44.02	43.47	41.58	18.44	21.09	21.44	23.19	21.02	21.12	24.09	25.50	25.50	24.00
A2	B1	28.70	31.81	37.83	46.01	35.97	36.88	41.92	43.09	42.47	40.91	16.26	21.10	21.07	15.13	18.39	21.30	24.66	25.79	24.21	24.44
	B2	29.07	33.89	42.95	39.56	36.21	39.82	41.95	45.10	45.15	42.98	17.20	20.17	19.99	26.01	20.81	23.44	24.97	25.40	27.01	25.21
	B3	31.07	40.26	46.61	41.20	39.74	42.70	46.78	50.14	48.01	46.97	19.90	21.81	25.07	24.80	22.86	25.14	27.18	28.55	28.53	27.39
Means		29.44	35.37	42.41	42.15	37.39	39.67	43.53	46.07	45.18	43.58	17.75	21.03	22.01	23.37	21.03	23.29	25.57	26.67	26.57	25.51
Average of B	B1	25.20	31.62	34.77	40.73	32.88	35.09	39.52	40.97	41.48	39.14	17.52	19.27	18.85	16.09	18.03	19.25	23.10	24.58	24.40	22.76
	B2	29.16	35.77	42.73	38.54	36.47	38.90	41.43	44.91	44.11	41.80	17.52	20.95	20.64	25.37	21.08	22.98	24.70	25.28	26.41	24.86
	B3	31.18	39.19	44.40	45.50	40.13	42.71	46.50	50.89	47.13	46.95	19.29	22.98	25.83	26.33	23.57	26.94	26.70	28.39	27.37	26.71
Over all		28.38	35.47	40.57	41.55	36.54	38.73	42.66	45.03	44.33	42.58	18.14	21.06	21.73	23.25	21.01	20.91	24.85	26.05	25.55	24.75
L S D 5 %	A	1.230*					NS					NS					NS				
	B	NS					0.750					2.568					0.950				
	C	1.791					1.060					2.721					0.911				
	AB	NS					1.713					NS					NS				
	AC	2.532					NS					3.848					NS				
	BC	3.100					NS					4.713					NS				
	ABC	4.386					NS					6.665*					NS				

A= Bio-fertilizers A1 = un-inoculated A2 = inoculate B= Organic fertilizers B1 = 0 ton fed^{-1} B2 = 5 ton fed^{-1} B3= 10 ton fed^{-1} C = nitrogen fertilizer C1= 0 % RD N fed^{-1} C2= 50% RD N fed^{-1} C3 =75% RD N fed^{-1} C4= 100 % RD N fed^{-1}

Effect of organic fertilization

Also, data showed that application of organic fertilizer at a rate of 5- 10 ton fed^{-1}resulted in a significant increases for nitrogen uptake (kg fed^{-1}) in grain and straw during the two growing seasons, except nitrogen uptake (kg fed^{-1}) in grain in the first season only was not significant increase. The relative increase reached to 10.92% at a rate 5 ton fed^{-1},- reached to 22.05% at a rate 10 ton fed^{-1} in the first growing seasons and increase reached to 9.80% at a rate 5 ton fed^{-1} – 19.95% at a rate 10 ton fed^{-1} in the second growing seasons for grains, 16.92% at rate 5 ton fed^{-1} – 30.73% at rate 10 ton fed^{-1} and increase reached to 9.23% at a rate 5 ton fed^{-1}, - reached to 17.36% at a rate 10 ton fed^{-1} for straw during the first and second seasons respectively, as compared with nonorganic fertilizer treatment. The increment of nutrient uptake is mostly dependent up on biological activity that is marked by affected by soil temperature, moisture, aeration and original soil PH (Jones et al., (1991). These findings are in agreement with those obtained by Adrien, (2006) and Mohammed et al., (2012).

Effect of mineral nitrogen fertilization (N).

Also, data showed that nitrogen uptake(kgN fed^{-1}) in grain and straw were significantly increased by increasing nitrogen levels from (0, 50, 75 and 100%) at the recommended N rate (75kg N fed^{-1}) during two growing seasons.

Effect of interactions:.

The interactions between inoculation × organic fertilizer (A×B) was not significant for nitrogen uptake (kg N fed^{-1})in grain and straw during two growing seasons, except nitrogen uptake (kg N fed^{-1})in grain in the second season was significantly increased. On the other hand, the effect of inoculation × mineral nitrogen fertilizer (A×C) interaction on the same measurement was significant increased in nitrogen uptake (kg N fed^{-1}) in grain and straw in the first season only, while the nitrogen uptake (kg N fed^{-1}) in grain and straw was not significantly during the second season only as well as the interaction between (A×C) or (A×B×C) led to significantly increased for nitrogen uptake (kg N fed^{-1}) in grain and straw in the first season only, while the nitrogen uptake (kg N fed^{-1}) in grain and straw was not significantly in the second season. Chauhan et al., (2011) and Mohammed et al., (2012).

Total nitrogen uptake (kg/fed.) by grain and straw:

Data in Table (7) showed that the total nitrogen uptake (kg fed^{-1}) by grain and straw of wheat as affected by different treatments and their interactions during two growing seasons.

Effect of inoculation:

It is quite clear from the data reported that total nitrogen uptake (kg fed^{-1}) by grain and straw was not significant in the first season. While total nitrogen uptake (kg fed^{-1}) in the second season was significantly influenced by inoculation.

Effect of organic fertilization:

From the above mentioned data it could be concluded that application of organic fertilization at a rate of 5 and 10 ton fed^{-1} resulted in a significantly increased for total nitrogen uptake taken up by wheat plants during the two growing seasons.

Effect of mineral nitrogen fertilization (N).

Also, data showed that total nitrogen uptake (kg N fed^{-1}) by wheat plants were significantly increased by increasing nitrogen levels from (0, 50, 75 and 100% N fed^{-1}) at the recommended N rate (75kg N fed^{-1}) during the two growing seasons.

Effect of interactions:.

The interactions between inoculation and organic fertilizer (A×B) was not significantly increased for total nitrogen uptake (kg N fed^{-1}) in the two growing seasons. On the other hand, the effect of inoculation and mineral nitrogen fertilizer (A×C) interaction on the same measurement was significant increased in total nitrogen uptake (kg N fed^{-1}) by wheat plants in the first season only, while total nitrogen uptake (kg N fed^{-1}) by wheat plants was not significantly in the second season as well as the interaction between (A×C) or (A×B×C) led to significantly increase for total nitrogen uptake (kg N fed^{-1}) by wheat plants in the first season only, while total nitrogen uptake (kg N fed^{-1}) by wheat plants was not significantly in the second season. The highest values were achieved by application at a rate of 5 ton / fed. organic fertilization and 75% N fed^{-1} at the recommended rate (75 kg N fed^{-1}) with inoculation *Azospirillum brasilenes* in the first season, while the highest values in the second season were achieved by application at rate of 10 ton fed^{-1} organic fertilizer and 75% N fed^{-1}at the recommended rate (75 kg N fed^{-1}) with inoculation *Azospirillum brasilenes*. Similar results were obtained by Chauhan et al., (2011) and Mohammed et al., (2012).

Grains yield quality of wheat:

Data given in Table (7) indicate the protein content in wheat grains as affected by application of mineral nitrogen fertilizer, organic fertilizer and inoculation with *Azospirillum brasilenes* during both growing seasons.

Effect of inoculation:

Table (7) showed that protein content in grains was not significantly affected by inoculation by *Azospirillum brasilenes* in first season, was significantly increased in the second season. These results are in the line with those obtained by Ahmed and Hassouna (2010) and Amanullah et al., (2012).

Effect of organic fertilization:

It is quite clear from the data reported that application of organic fertilization at a rate of 5 and 10 ton fed^{-1} a significantly increased for protein content in wheat grains compared to the control treatment (no addition of organic fertilizer) in the two growing seasons. The increment of protein content reached to 1.31% at a rate 5 ton fed^{-1}, 6.86 at a rate 10 ton fed^{-1} and increased reached to 1.88% at rate 5 ton fed^{-1} 6.67% at rate 10 ton fed^{-1} during the first and the second seasons, respectively as compared to the control.

These results are in agreement with those obtained by El- Kouny (2007) who indicated that crude protein percentages in wheat grains significantly increased due to organic manure (compost).

Table (7): Effect of inorganic, organic and biofertilization and their interactions on total nitrogen uptake (kg fed^{-1}) by wheat plants and protein content in grain of wheat.

A	B	Total uptake of N(kg fed^{-1}) Season 1					Season2					Protein % Season 1					Season2				
		C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean	C1	C2	C3	C4	mean
	B1	40.11	48.4	48.67	52.45	47.73	50.88	58.73	62.55	65.09	59.04	6.36	6.69	6.91	7.04	6.75	6.37	6.86	6.93	7.07	6.80
A1	B2	47.1	59.05	63.79	59.08	58.07	60.18	65.72	67.05	69.3	65.41	6.65	6.87	7.03	7.17	6.93	6.79	6.89	7.06	7.21	6.96
	B3	49.68	62.54	68.77	76.47	64.47	66.23	72.78	79.33	72.75	72.61	7.25	7.43	7.51	7.53	7.43	7.31	7.51	7.53	7.55	7.48
Means		45.76	56.66	60.19	62.37	56.42	58.93	65.56	69.52	68.97	65.58	6.75	7.00	7.19	7.25	7.04	6.79	7.09	7.17	7.28	7.08
	B1	44.96	52.91	58.9	67.08	54.36	58.18	66.58	68.88	66.68	65.35	6.70	6.91	7.04	7.14	6.95	6.88	6.95	7.10	7.16	7.02
A2	B2	46.27	54.06	62.94	59.55	57.02	63.26	66.92	70.5	72.16	68.19	6.76	6.95	7.10	7.01	6.95	6.95	7.04	7.18	7.27	7.11
	B3	50.97	62.07	71.68	66.27	62.6	67.84	73.96	78.69	76.54	74.36	6.95	7.10	7.54	7.27	7.21	7.26	7.33	7.57	7.43	7.40
Means		47.19	56.4	64.42	64.16	58.42	62.96	69.1	72.74	71.75	69.09	6.80	6.98	7.23	7.14	7.04	7.03	7.10	7.28	7.29	7.18
	B1	42.72	50.89	53.62	59.58	50.91	54.34	62.62	65.55	65.88	61.9	6.53	6.80	6.98	7.09	6.85	6.62	6.90	7.01	7.11	6.91
Average of B	B2	46.68	56.72	63.37	59.18	57.55	61.88	66.13	70.19	70.52	66.66	6.70	6.91	7.06	7.09	6.94	6.82	6.97	7.12	7.24	7.04
	B3	50.47	62.17	70.23	71.33	63.7	69.65	73.2	79.28	74.5	73.66	7.10	7.26	7.52	7.40	7.32	7.29	7.42	7.55	7.49	7.44
Over all		46.52	56.53	62.3	63.28	57.55	59.64	67.51	71.08	69.88	67.33	6.78	6.99	7.19	7.19	7.04	6.91	7.10	7.23	7.28	7.13
L S D 5 %	A	NS					3.093*					NS					0.0213				
	B	4.118					2.653					0.0747					0.0134				
	C	3.000					2.830					0.0695					0.0092				
	AB	NS					NS					0.1056					0.0189				
	AC	4.240					NS					0.0982					0.0129				
	BC	2.871					NS					NS					0.0158				
	ABC	7.343					NS					0.1702*					0.0224				

A= Bio-fertilizers A1 = un-inoculated A2 = inoculate B= Organic fertilizers B1 = 0 ton fed^{-1} B2 = 5 ton fed^{-1} B3= 10 ton fed^{-1} C= nitrogen fertilizer C1= 0 % RD N fed^{-1} C2= 50% RD N fed^{-1} C3 =75% RD N fed^{-1} C4= 100 % RD N fed^{-1}

Effect of mineral nitrogen fertilization (N).

Data also, reveal that protein content in wheat grains showed significant increases as a result of applied different nitrogen levels (0, 50, 75 and 100% N fed^{-1}) from the recommended N rate (75kg N fed^{-1}) during two growing seasons.

Relative increase of protein content 3.1% , 6.05% and 6.05% in the first season and 2.7% , 4.63% and 5.35% in the second season were also obtained due to the addition of 50% , 75% and 100% from the recommended rate (75 kg N fed^{-1}) respectively, over the rate of 0.0% (control) for the two seasons. These results are in agreement with those obtained by Delin et al., (2005) and Azer and sadek, (2007).

Effect of interactions:.

The interaction effect between the three studied factors on protein content in wheat grains were significant increased in the two growing seasons, except the interaction effect between organic fertilizer × N fertilizer (B×C) on protein content in grains was not significant in the first season only.

Economic advantage of biofertilization use:

It is important to evaluate the economic aspect of using biofertilization practice (*Azospirillum brasilenes*) due to wheat crop in Table (8). The cumulative income of the inoculant is estimated according to the average of the results obtained in both tested seasons. Data in table (8) showed that the highest net return L E 1089.56 was recorded by use of interactions between inoculation with 10 ton fed^{-1}. organic fertilizer and 75 % N from recommended rate (75 Kg N fed^{-1}.) (treatment).

Table (8): Economic of biofertilization use efficiency

Inoculation status	Treatments Organic fertilizer	N levels from R. rate 75 kg N/fed.	Wheat grain yield (ton / fed.)	Wheat Yield increase (ton / fed)	Value of grain yield (EL.)	Wheat straw yield (ton / fed.)	Straw Yield increase (ton/ fed	Value of straw yield (EL.)	Total value of yield increased
Uninoculation	0.0 ton/ fed	0.0%	2.721			4.967			
		50%	3.023			5.452			
		75%	3.206			5.410			
		100%	3.523			5.811			
	5 ton / fed	0.0%	2.859			5.283			
		50%	3.247			5.937			
		75%	3.420			6.166			
		100%	3.210			6.281			
	10 ton / fed	0.0%	2.631			5.773			
		50%	3.084			5.417			
		75%	3.266			5.369			
		100%	3.096			5.088			
Inoculation	0.0 ton/ fed	0.0%	2.74	0.019	50.62	4.844	-0.123	-36.9	13.72
		50%	3.033	0.010	26.64	5.473	0.021	6.3	32.9
		75%	3.244	0.043	114.55	5.467	0.057	17.1	131.65
		100%	3.526	0.003	7.99	5.915	0.105	31.5	39.49
	5 ton / fed	0.0%	2.906	0.047	125.21	5.328	0.045	13.5	138.71
		50%	3.302	0.055	146.52	5.599	-0.338	-101.4	45.12
		75%	3.555	0.135	359.64	5.946	-0.22	-66	293.64
		100%	3.343	0.163	434.23	6.028	-0.338	-75.9	358.33
	10 ton / fed	0.0%	2.903	0.272	724.61	5.416	-0.357	-107.1	617.51
		50%	3.202	0.118	314.35	5.832	0.415	124.5	438.85
		75%	3.617	0.135	935.06	5.884	0.515	145.5	1089.56
		100%	3.455	0.259	689.98	5.074	-0.009	-2.7	687.28

Each value in this table is an average of the results of the two Seasons.
Prices : wheat grains L E. 2664 / ton, wheat straw LE. 300 / ton.

As a conclusion supplying wheat plants with N at 56.25 kg fed^{-1}. (75% from recommended rate 75 kg N fed^{-1}.) in the form of inorganic N, organic fertilizer at 10 ton fed^{-1} and biofertilization is suggested to be beneficial for improving quantity and quality of wheat yields which in turn improved protein content.

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تأثير التسميد العضوي والحيوي كبديل جزئي للتسميد النيتروجيني المعدني علي القمح.

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أجريت تجربة حقلية خلال موسمي نمو متتاليين (٢٠١٢/٢٠١٣م و٢٠١٣/٢٠١٤م) في مزرعة التجارب بمحطة البحوث الزراعية بملوى- مركز ملوي – محافظة المنيا – مصر و الهدف من هذا البحث هو دراسة تأثير إضافة مستويات مختلفة من التسميد النيتروجيني المعدني و التسميد العضوي و التلقيح علي عدد البكتريا / جرام تربة و المحصول وجودة المحصول و علي محتوي النيتروجين امتصاصة بواسطة نباتات القمح صنف بني سويف ١ النامية في تربة طمية طنية سلتية. و قد أظهرت النتائج المتحصل عليها أن زيادة مستوي التسميد النيتروجيني المعدني من صفر % ، ٥٠ % ، ٧٥ % ، ١٠٠ % من معدل التسميد النيتروجيني الموصي به (٧٥ كجم ن / فدان) أدت إلي زيادة معنوية في كل الصفات محل الدراسة (وزن ال ١٠٠٠ حبة بالجرام ، محصول الحبوب ، محصول القش ، النسبة المئوية للبروتين في الحبوب ، محتوي الحبوب و القش من النيتروجين و النيتروجين الممتص بواسطة الحبوب و بواسطة القش و النيتروجين الكلي الممتص بواسطة الحبوب و القش) ما عدا عدد البكتريا / جرام تربة كان غير معنوي. كانت هناك زيادة معنوية في كل الصفات محل الدراسة نتيجة لزيادة مستوي التسميد العضوي من صفر إلي ٥ طن / فدان أو ١٠ طن / فدان ما عدا النيتروجين الممتص بواسطة الحبوب في الموسم الاول كان غير معنوي. أدي تلقيح نباتات القمح بالازوسبرلليم إلي زيادة معنوية في عدد البكتريا / جرام تربة و وزن ال ١٠٠٠ حبة بالجرام ، محتوي الحبوب من النيتروجين في الموسم الثاني و محتوي القش من النيتروجين ، النيتروجين الممتص بواسطة الحبوب في الموسم الاول و النيتروجين الكلي الممتص في الموسم الثاني و النسبة المئوية للبروتين في الحبوب في الموسم الثاني فقط. بينما كانت الزيادة غير معنوية في محصول الحبوب و القش و محتوي النيتروجين في الحبوب في الموسم الاول و النيتروجين الممتص بواسطة الحبوب في الموسم الثاني ، النيتروجين الممتص بواسطة القش ، و النيتروجين الكلي الممتص بواسطة الحبوب و القش في الموسم الاول و النسبة المئوية للبروتين في الحبوب في الموسم الاول. و قد تم الحصول علي اعلي القيم للصفات محل الدراسة عندما سمدت نباتات القمح بالسماد النيتروجيني المعدني بمعدل ٧٥ % من المعدل الموصي به من النيتروجين (٧٥ كجم ن / فدان) مع السماد العضوي بمعدل ١٠ طن / فدان و عندما لقحت نباتات القمح بالازوسبرلليوم كان تأثير التدخلات بين العوامل الثلاثة محل الدراسة علي معظم الصفات محل الدراسة كان معنوي ما عدا عدد البكتريا لكل جرام تربة، محصول الحبوب في الموسم الثاني و محصول القش في الموسم الثاني و النيتروجين الممتص بواسطة الحبوب في الموسم الثاني و النيتروجين الممتص بواسطة القش في الموسم الثاني و النيتروجين الكلي الممتص في الموسم الثاني كان غير معنوي. تشير النتائج إلي أن إضافة السماد النيتروجيني المعدني بمعدل ٥٦.٢٥ كجم نيتروجين / فدان (٧٥ % من المعدل الموصي به ٧٥ كجم نيتروجين / فدان مع السماد العضوي بمعدل ١٠ طن / فدان للتربة الطميية الطينية السلتية المنزرعة بالقمح و التلقيح بالازوسبرلليوم أدي إلي تحسين كمية و جودة محصول القمح.

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