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Effect of organic fertilizer and chemical fertilizer on growth and yield of Wheat (Triticum aestivm)

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ABSTRACT

Current study was conducted in pot and open field of Bakrajo Technical Institute BTI Field, Sulaimani Polytechnic University, Sulaimani Iraq, during growing season of 2021-2022. The pot experiment was under a one-year rotation of (Triticum aestivum) winter wheat open field cultivation. The applications were PL (poultry litter 50 gm/pot), LM (livestock manure50 gm /pot), and CF (chemical fertilizer 20:20:20 N:P: K in 3 gm/pot) ,the applications testes on growth and yield parameters(Biology.yield/plant(g), 1000-grain weight(g), Weight of spikes/plant(g) Spike length (cm), No. of grains/ spike, No. of spikes/plant Weight, Weight of grains/spike(g), Grain yield/Plant(g)and Harvest Index and the mention application compared withcontrol without using of any chemical ad organic fertilizers .(in A completely randomized design (CRD) with three replications with interaction. The results indicated that applications of interaction of poultry with chemical fertilizer20:20:20 N:P: K in 3 gm/pot positive effect and poultry (poultry litter 50 gm/pot), chemical fertilizer fertilizer20:20:20, interaction of Animal manure with chemical fertilizer and Animal manure (5.313,4.838, 5.833, 3.853, 3.225,1.217), respectively influenced. however, replications effect indicated that R1 top influence and R3, R2 (respectively influenced.

Key words: Wheat, Organic Manure, chemical fertilizer, poultry manure

1. INTRODUCTION

Poultry dung supplies nutrients and is chosen because it contains more macronutrients other manures (Khaliq et al., 2004) (Kumar et al., 2022). Its appropriate application improves soil and plant nutritional status (Agbede et al., 2008) (Yadav, et al., 2022) and is advantageous because it improves soil fertility, soil organic matter, soil biota activities, and water holding capacity (Blay et al., 2002). Poultry dung has a high concentration of micronutrients and has a pH of 6-7. (Chastain et al., 2001). In cereals, chicken manure combined with urea boosts yield components more than other organic manures (Khaliq et al., 2004). Integration of poultry manure with urea aids in the restoration of deteriorated soils and is also more cost effective than urea application alone (Mondero et al., 2004) (Choudhary et al., 2022). It has been discovered that increasing nitrogen usage efficiency enhances yield, activates the low affinity transport pathway of nitrogen absorption, and results in high yield (Cui et al., 2008).

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The use of chicken manure (layer or broiler) considerably boosted yield components and grain yield. Grain yield, crude protein content of grains, number of viable tillers, spike length, flag leaf area, fresh weight, dry weight, plant height, and number of grains improved with increasing nitrogen rate, however maximal agronomic nitrogen use efficiency for yield productivity was not reached (Shahid et al., 2015) (Maurya et al.,2022). Plant growth analysis allows for a better knowledge of crop growth variance (Lambers, 1987). (Amanullah, and Stewart, 2013; Amanullah, 2014a, 2015a). The administration of mineral supplements has a significant impact on photosynthetic and dry matter accumulation (Costa et al., 2002; Amanullah et al., 2014). Although there are several NPK fertilizer sources, there has been no published research on crop growth analysis water usage efficiency response of crop species cultivated with various NPK sources (Hariyadi et al., 2018). Unbalanced nutrient treatment has a negative impact on crop growth (Amanullah, and Stewart, 2013; Amanullah, 2015b). Because of the current climatic situation and water scarcity, increasing irrigated water efficiency. Some findings indicated substantial differences in productivity between crop development phases and NPK sources. In terms of yield, barley and wheat were the leading crops under each NPK source (Amanullah et al., 2017).

Organic inputs including such farmyard manure and animal manure manures have tremendous potential to enhance soil characteristics, crop yield, and nutrient availability; however, due to their low nutrient status, the exclusive application of natural amendments of plant nutrients does not produce a significant increase in crop yields. To maintain soil productivity on a long-term basis, a combination of organic and fertilizer application sources of nutrients must be used (Choudhary et al., 2022). Regular use of organic fertilizer sources such as vegetable and animal manure help to produce soil organic matter, increase microbial activity, and enhance soil physical qualities (Gu et al., 2022). The only use of chemical fertilizer nutrient sources, on the other hand, offers primarily one or more critical plant nutrients that the soil cannot give in sufficient amounts. Arid land soils, in general, have poor essential fertility and hence require external inputs to enhance. On the other hand, organic waste disposal is a severe environmental issue; so, decomposing these wastes into organic fertilizers for crop cultivation would aid in sustaining soil productivity while minimizing agricultural inputs (Bruce et al., 2007).

The utilization of available organic plant nutrients to improve soil fertility and preserve crop output should be done in a coordinated way (FAO, 1993). In the tropical globe, there is a rising interest in employing organic plant nutrients to improve soil efficiency and decrease the need of inorganic fertilizers (Ayeni, and Adetunji, 2010). Furthermore, there is an abundance of organic sources such as agricultural leftovers, green manure, and animal dung manures; yet, the effect of

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integrated usage of organic and mineral fertilizers on crop quality has received little scientific attention. These factors necessitated the need to investigate the potential use of available natural amendments and inorganic fertilizers to enhance crop quality and yields (Wang et al., 2023). It was in this context that this study was conducted in arid land in western Saudi Arabia to quantify the effects of organic inorganic fertilizer and their combinations on the protein, oil, and mineral content of grain of two maize cultivars (Awad et al., 2014).Nutritional value of Triticum sp. is absolutely critical because it is one of the few crop species that is widely grown as a staple feed ingredient; its grain can be turned into flour, semolina, and other basic components of bread and other bakery products, as well as pastas, and is thus the primary source of nutrients for the majority of the world's population (ramková et al., 2009). It is a widely consumed meal that delivers more calories and proteins to the global diet than any other cereal crop (Biesaga-Kocielniak et al., 2014). Improving yield is accomplished by either increasing the area under cultivation or raising the yield per unit area; the first option is fairly restricted and has contributed to an increase in yield per unit area (Moradi et al., 2015).

The United Nations expects that the global population will increase during the next few decades. As a result, in order to ensure food security and environmental preservation, the globe must boost crop yields through better use of water and fertilizer (Foulkes et al., 2010). The integration of metabolic reactions in plants results in total biomass. Consequently. Plant nutrition is a major element influencing the number and quality of secondary metabolites in plants. To address the ever-increasing demand for medicinal plants, the optimal fertilizer application procedures must be established. It is clear that the essential oil concentration increases with plant age, peaking at the post-flowering period. Growth phases, ecological and climatic factors can all impact plant fresh herb production, essential oil concentration, and composition. Numerous initiatives have been undertaken to boost the production potential of medicinal plants (Das et al., 2007; Sharma, and Kumar, 2011), but they are concerned with the use of inorganic fertilizers, which may have an impact on the biological aspects of the soil. As a result, the usage of organic and bio fertilizers is becoming increasingly important in order to increase output and quality. The increasing demand for livestock and poultry products in China has resulted in a spectacular surge in the expansion of the livestock and poultry farming industries in recent years. The volume of animal dung excreta has increased in proportion. Estimated data revealed that the number of manures and litters in China was around 2.21 Gt in 2003, accounting for more than 40% of total agricultural organic waste resources (Huang et al., 2006). Excreta from animals have become a danger to the rural biological environment.

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The aim of current study to know the effect of organic fertilizer, chemical fertilizer NPK (20:20:20) granular and organic fertilizer (poultry litter and (livestock manure) adding methods and fertilizer levels on some growth indicators of growth and yield (Triticum aestivm).

2. RESEARCH METHODS

Study area

A pot and field experiment were conducted during autumn agricultural season of 2022 in bakrajo technical institute BTI fields Sulaimani governorate 2021. The pot experiment was under a one-year rotation of (Triticum aestivum)-winter wheat. The treatments were PL (poultry litter 50 gm/pot), LM (livestock manure50 gm /pot), and CF (chemical fertilizer fertilizer20:20:20 N:P: K in 3 gm/pot) in A completely randomized design (CRD) with 3 replications with interaction. The poultry litter was collected from an intensive laying-hen farm, while the livestock manure was gathered from an intensive Animal manure farm. The PL and LM were applied at a rate of 21 t/ha in wet weight. Biological yield was calculated. Soil samples were collected from surface A horizons of top soil from Bakrajo technical Institute Field selective soil sample characteristics were analyzed table 1.

Table 1. soil physiochemical fertilizer analyses

#	Properties	Values
1	Ec dS.M^{-1}	0.31
2	pH	7.14
3	% N	0.28
4	P available (ppm)	31
5	K^{+} Soluble (mg. l^{-1})	0.235
6	Ca^{+2} Soluble (mg. l^{-1})	0.392
7	Mg^{+2} Soluble (mg. l^{-1})	1.01
8	% Sand	12.36
9	%Silt	41.45
10	%Clay	45.2
11	Texture	Silty Clay

In current study biological yield of plant were investigated which included i plant/plant (g), weight of 1000 grains in, weight of spike(g), spike length (cm), number of grains, number of spikes per plant, weight of grains, grain yield per plant and harvest index all weight measured by advanced precision balance in accurately also chlorophyll spad reading were measured in mid-season of growing. All the observations were recorded in triplicate. Data were analyzed using excel xlstat 2019 and correlation studies were described by Raghavrao (1983).

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Pot Experiment

The pot experiment was conducted in open field of Bakrajo Technical Institute BTI Fields, Sulaimani Polytechnic University, Sulaimani Iraq, during the growing season of 2021-2022. Plastic pots of 30-liter capacity were used in the experiment. Each pot was filled with 23 kg surface soil (0-20 cm). The seeds of Wheat were sown on December, 2022 in pots, 6 seedlings were transplanted in each pot Plants were harvested after 180 days, i.e., on July 14, 2022. The experiment was laid according to randomized complete block design with three replications. Wheat growth and yield were main plots.

Statistical Analysis

All data were analyzed by analysis of variance (ANOVA) procedures using Excel xl state program (2019). After analysis of variance correlation.

3. RESULTS and DISCUSSION

Soil physiochemical fertilizer analysis shows in table 1 and normal range all properties according to (Hom etal.,1994), and Table 2 explained summary statically analysis of the study which Biological yield of plant in grams with lowest value (0.920) ,highest value 6.260 also mean range 4.047 and stander deviation 1.759(Ahmed et al., 2023), later second parameter thousand grain weight in gram minimum data which (20.4) and maximum value (49.6) with mean, and standard deviation (38.801 and 9.995) respectively(Zhang et al., 2023), whether, weight of spikes of plant in gram largest record (5.463) and smallest value (0.842),average and standard deviation (3.128, 1.654) correspondingly(Oumata et al., 2023), next variable spike length in centimeter highest value (9.333) but lowest value (3.320) with mean and standard deviation (7.224, 2.20) respectively(Afzal et al., 2023), later parameter number of spikes per plant which data table 2 explained in maximum value with (36.603) and minimum value in (11.750) also, average and stander deviation (25.346 and 8.872)(Pan et al., 2023). whether weight of grain spike in gram per plant with highest value of (1.620 gram) but, lowest value which is (0.380 gram) with mean and stander deviation (1 and 0.418) consequently (Ashour et al., 2023) later grain yield parameter per plant in gram which maximum recorded is (3.936 gram) and minimum value with (0.311 gram) but mean and stander deviation respectively (2.237 and 1.168) (Jat et al., 2023). Final parameter as a main factor is harvest index with biggest value is (0.734) and smallest value is 0.342) and mean with stander deviation were (0.534 and 0.108) consequently (Singh et al., 2023:Hemmati, and Soleymani, 2014).

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Table2. Summary statistical analysis of Parameters variables

Variable	Observations	Minimum	Maximum	Mean	Std. deviation
Biology.yield/plant(g)	18	0.920	6.260	4.047	1.759
1000-grain weight(g)	18	20.400	49.600	38.801	9.995
Weight of spikes/plant(g)	18	0.842	5.463	3.128	1.654
Spikelength(cm)	18	3.320	9.333	7.224	2.200
No. ofgrains/spike	18	11.750	36.603	25.346	8.872
No. of spikes/plant Weight	18	1.400	3.600	2.641	0.621
Weight of grains/spike(g)	18	0.380	1.620	1.000	0.418
Grain yield/Plant(g)	18	0.311	3.936	2.237	1.168
Harvest Index.	18	0.342	0.734	0.534	0.108

Table 3. Effect of organic and chemical fertilizer in the growth and yield of Wheat

APPLICATIONS	Biology. yield/ plant (g)	1000-grain weight (g)	Weight of spikes /plant (g)	Spike length (cm)	No. of grains/ spike	No. of spikes /plant	Weight of grains/ spike (g)	Grain yield / Plant (g)	Harvest Index.
Poultry + Chemical fertilizer	5.313 ^{ab}	46.165 ^{a}	4.833 ^{a}	8.651 ^{a}	33.017 ^{a}	3.031 ^{ab}	1.354 ^{a}	3.370 ^{a}	0.640 ^{a}
Poultry	4.838 ^{abc}	44.968 ^{a}	4.157 ^{ab}	8.794 ^{a}	34.143 ^{a}	2.603 ^{b}	1.294 ^{a}	3.107 ^{a}	0.645 ^{a}
Chemical fertilizer	5.833 ^{a}	44.600 ^{a}	3.920 ^{ab}	8.100 ^{a}	27.133 ^{ab}	3.333 ^{a}	1.180 ^{a}	3.194 ^{a}	0.552 ^{ab}
Animal manure + Chemical fertilizer	3.853 ^{bc}	38.267 ^{a}	2.587 ^{bc}	7.633 ^{a}	20.933 ^{bc}	2.747 ^{ab}	0.860 ^{ab}	1.567 ^{b}	0.399 ^{c}
Animal manure	3.225 ^{c}	37.533 ^{a}	2.358 ^{bc}	6.825 ^{a}	21.317 ^{bc}	2.533 ^{b}	0.872 ^{ab}	1.620 ^{b}	0.509 ^{bc}
Control	1.217 ^{d}	21.273 ^{b}	0.912 ^{c}	3.340 ^{b}	15.533 ^{c}	1.600 ^{c}	0.443 ^{b}	0.567 ^{c}	0.456 ^{bc}
Pr > F(Application types)	0.001	0.004	0.005	0.001	0.015	0.002	0.020	< 0.0001	0.006
Significant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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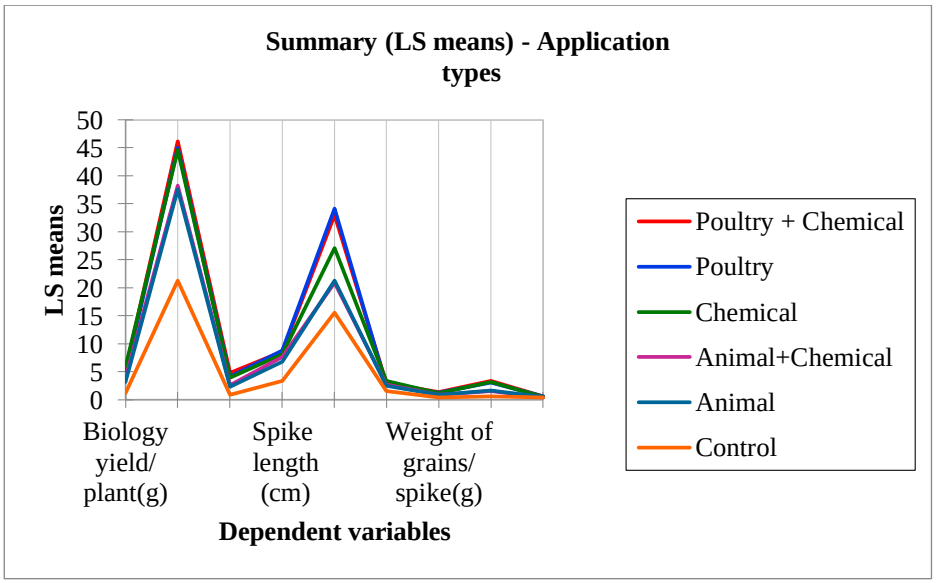

Figure 1. effects of Application parameters on wheat growth and yields

Effect and results of biological yield per plant on the Wheat growth and yields

Table 3 and figure 1 explained data analysis of biological yield per plant in gram also table 4 represents Analysis of the differences between the categories with a confidence interval of 95% (Biology yield/ plant(g)) with effects of organic, chemical fertilizer , and Animal manure fertilizers with interaction of each parameters while for biological yield chemical fertilizer first effects with letters (a) and positive significant value is (5.833) from current study more effective and effects but with same effect of interaction of poultry and chemical fertilizer , however , interaction between poultry and chemical fertilizer in the second significant record with letter of(ab) and value of (5.313) also, Animal manure and chemical fertilizer interaction parameters in the third significant value of ($p>0.05$) and letter (bc) , positive record value is (3.853) in spite of each parameters compared with control treatment .as well as Animal manure parameter with letter (c) in the fourth grade effects on yield and growth under ($p>0.05$) with value of (3.225) also , poultry parameter effect on the growth and yield with letter (abc) in the fifth grade effects with significant value (4.838) of ($p>0.05$) and final letter of (d) for control as minimum effect without any treatment and with value (1.217) the result accepts with (Hemmati, and Soleymani, 2014)

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Table 4. Analysis of the differences between the categories with a confidence interval of 95% (Biology yield/ plant(g)

Applications	LS means	Groups			
Chemical	5.833	A			
Poultry+ Chemical	5.313	A	B		
Poultry	4.838	A	B	C	
Animal + Chemical	3.853		B	C	
Animal	3.225			C	
Control	1.217				D

Effects and results of thousand-gram weight (gram) on the Wheat growth and yield

According to effect of thousand-gram weight (gram) on the Wheat growth and yield data analysis table 3 and figure 1 represented significant results and the application parameters on the other hand table 5 explained Analysis of the differences between the categories with a confidence interval of 95% (1000-grain weight(g)) results indicated effects in the first grade and (a letter) where are (Poultry with chemical fertilizer , poultry , chemical fertilizer ,Animal manure with chemical fertilizer , and Animal manure) and values (46.165,44.968,44.6,38.267, and 37, 533) respectively and under ($p>0.05$) also compared with control application in the last grade with (b letter) and value of (21.273) (Hemmati, and Soleymani, 2014) (Alaru et al., 2014).

Table 5. Analysis of the differences between the categories with a confidence interval of 95% (1000-grain weight(g))

Applications	LS means	Groups	
Poultry+ Chemical	46.165	A	
Poultry	44.968	A	
Chemical	44.600	A	
Animal + Chemical	38.267	A	
Animal	37.533	A	
Control	21.273		B

Effects and results of weight of spikes per plant in gram on the Wheat growth and yield

Table 3 and figure 1 shows weight of spikes per plant in gram on the Wheat growth and yield also table 6 explained Analysis of the differences between the categories with a confidence interval of 95% (Weight of spikes /plant(g)): that effect of application s where interaction of poultry with chemical fertilizer in the first grade with (a letter) and positive significant value of (4.833) also with same effect for (poultry, chemical fertilizer) and (ab letter) also significant values were (4.157 and 3.920) ,but the effects of Animal manure with chemical fertilizer , and

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Animal manure with (bc letter0 significant values(2.587and 2.358) each parameters compared with control in last grade with (c letter0 and value of (0.912) result accepts with (Hemmati, and Soleymani, 2014) (Alaru et al., 2014) and under (p>0.05) .

Table 6. Analysis of the differences between the categories with a confidence interval of 95% (Weight of spikes /plant(g))

Application	LS means	Groups		
Poultry +Chemical	4.833	A		
Poultry	4.157	A	B	
Chemical	3.920	A	B	
Animal + Chemical	2.587		B	C
Animal	2.358		B	C
Control	0.912			C

Effects and results of spike length in (cm) on the Wheat growth and yield

According to effect of spike length on the Wheat growth and yield data analysis Table 3 and figure 1 represented significant results and the application parameters and table 7 shows Analysis of the differences between the categories with a confidence interval of 95% (Spike length (cm)) with of same effects in the first grade and (a letter) where are (Poultry with chemical fertilizer , poultry, chemical fertilizer , Animal manure with chemical fertilizer , and Animal manure) and values (8.651,8.794 ,8.1,7.633, and 6.825) respectively also compared with control application in the last grade with (b letter) and value of (3.340) (Ali, and Manea, 2018). (Abbas etal., 2012) and under (p>0.05)

Table 7. Analysis of the differences between the categories with a confidence interval of 95% (Spike length (cm)

Applications	LS means	Groups	
Poultry	8.794	A	
Poultry+ Chemical	8.651	A	
Chemical	8.100	A	
Animal + Chemical	7.633	A	
Animal	6.825	A	
Control	3.340		B

Effects and results of number of grains per spike on the Wheat growth and yield

Table 3 and figure 1 explained number of grains per spike on the Wheat growth and yield as well as,table8 explained the effect Analysis of the differences between the categories with a confidence interval of 95% (No. of grains/ spike) and the applications where interaction of poultry with chemical fertilizer also poultry in the first grade with (a letter) and positive

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significant values of (33.017 and 34.143) respectively also with same effect for (chemical fertilizer) (ab letter) with significant values (27.133) ,but the effects of Animal manure with chemical fertilizer , and Animal manure with (bc letter) where significant values(20.933 and 21.317) (Jassim, A. H. and Mohammed, R.H. 2019) and under (p>0.05) consquently each parameters compared with control in last grade with (c letter) and value of (15.533) result accepts with (Hemmati, and Soleymani, 2014) (M. Alaru et al., 2014).

Table 8. Analysis of the differences between the applications with a confidence interval of 95% (No. of grains/ spike)

Applications	LS means	Groups		
Poultry	34.143	A		
Poultry +Chemical	33.017	A		
Chemical	27.133	A	B	
Animal	21.317		B	C
Animal +Chemical	20.933		B	C
Control	15.533			C

Effects and results of number spikes per plant on the Wheat growth and yield

Table 3 and figure 1 represented number spikes per plant on the Wheat growth and yield also table 9 shows Analysis of the differences between the categories with a confidence interval of 95% (No. of spikes /plant Weight) that effect of application s where chemical fertilizer application in the first grade with (a letter) and positive significant values of (3.333) also with same effect for (poultry with chemical fertilizer and Animal manure with chemical fertilizer) (ab letter) with significant values (2.603and 2.747) in the second grade effect ,but the effects of poultry application and Animal manure application , with (b letters) where significant values(2.603 and 2.533)(Upadhyay et al., 2022) (Jassim, and Mohammed, 2019) and under (p>0.05) consequently each parameters compared with control in last grade with (c letter) and value of (1.6) result accepts with (Hemmati, and Soleymani, 2014) (Alaru et al., 2014).

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Table 9. Analysis of the differences between the categories with a confidence interval of 95% (No. of spikes /plant Weight):

Applications	LS means	Groups		
Chemical	3.333	A		
Poultry+ Chemical	3.031	A	B	
Animal+ Chemical	2.747	A	B	
Poultry	2.603		B	
Animal	2.533		B	
Control	1.600			C

Effects and results of weight of grains per spike in gram (g) on the Wheat growth and yield

According to effect of weight of grains per spike in gram (g) Wheat growth and yield data analysis Table 3 and figure 1 represented significant results and the application parameters with of same effects in the first grade and (a letter) where are (Poultry with chemical fertilizer , poultry , chemical fertilizer), and significant values (1.354, 1.294 ,1.180 ,) respectively but he same effect and same grade of Animal manure with chemical fertilizer and Animal manure applications of (ab letters) and significant values recorded (0.860 and 0.872) compared with control application in the last grade with (b letter) and value of (0.443) (Ali, and Manea, 2018). (Abbas et al., 2012) and under ($p > 0.05$) also table10 explained Analysis of the differences between the categories with a confidence interval of 95% (Weight of grains/ spike(g)).

Table 10. Analysis of the differences between the categories with a confidence interval of 95% (Weight of grains/ spike(g)

Applications	LS means	Groups	
Poultry+ Chemical	1.354	A	
Poultry	1.294	A	
Chemical	1.180	A	
Animal	0.872	A	B
Animal+ Chemical	0.860	A	B
Control	0.443		B

Effects and results of grain yield per plant in gram on the Wheat growth and yield

According to effect of grains yield per plant in gram (g) Wheat growth and yield data analysis Table 3 and figure 1 and table11 represented significant results and the application parameters with of effects in the first grade and (a letter) where are (Poultry with chemical fertilizer , poultry , chemical fertilizer), and significant values (3.370 , 3.107 ,3.194)(Sirohiya et al., 2022) respectively but he same effect and same grade of Animal manure with chemical fertilizer and Animal manure applications of (b letters) and significant values recorded (1.567 and

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1.620) compared with control application in the last grade with (c letter) and value of (0.567) (Ali, & Manea, 2018). (Abbas, et al., 2012) and under ($p>0.05$).

Table11. Analysis of the differences between the categories with a confidence interval of 95% (Grain yield /Plant(g))

Applications	LS means	Groups		
Poultry+ Chemical	3.370	A		
Chemical	3.194	A		
Poultry	3.107	A		
Animal	1.620		B	
Animal+ Chemical	1.567		B	
Control	0.567			C

Effects and results of Harvest Index on the Wheat growth and yield

Results shows according to Table 3 ,figure 1 and table 12 harvest index on the Wheat growth and yield that effect of application s where poultry with chemical fertilizer and poultry application in the first grade with (a letter) and positive significant values of (0.640 and 0.645) also with same effect for (chemical fertilizer) (ab letter) with significant values (0.552) , the third grade effect application of interaction of Animal manure with chemical fertilizer of (c letter) and positive value (0.399) ,but the effects of Animal manure with chemical fertilizer application with same effect with control and (bc letters) and values recorded(0.509and 0.456) ,(Jassim, A. H. & Mohammed, R.H. 2019) and under ($p>0.05$) consequently each parameters compared with control in (Hemmati, and Soleymani, 2014) (Alaru et al., 2014).

Table12. Analysis of the differences between the categories with a confidence interval of 95% (Harvest Index)

Applications	LS means	Groups		
Poultry	0.645	A		
Poultry+ Chemical	0.640	A		
Chemical	0.552	A	B	
Animal	0.509		B	C
Control	0.456		B	C
Animal + Chemical	0.399			C

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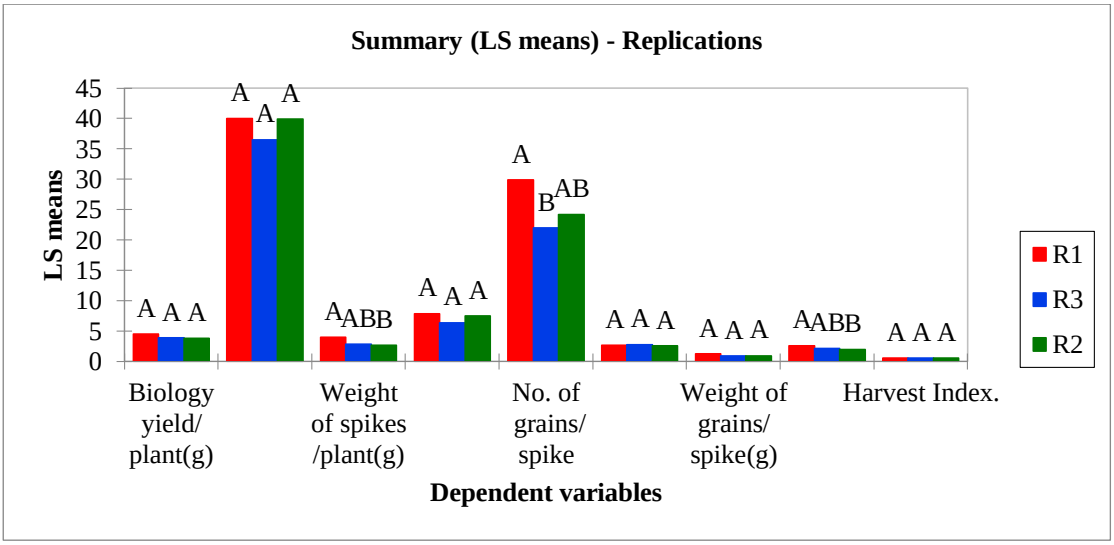

Figure.2 Replication effects and grouping of application replications

Comparisons of replications effects and grouping of replications

According to figure 2 that biological yield replication that replication in the same group with group (A) but replication 1 from the first with least square means value of (4.517) and replication 3 ,2 respectively and least square means values (3.843, 3.780), on the other hand thousand-gram weight in gram replications with Catha gory of (R1, R2, and R3) with group (A) for three replication and least square means values (39.966, 39.942 and 36.513) respectively, whether, Least Square means (Weight of spikes/plant(g) classified to (2) two group (A and B) which (R1) with group A and first effect least square means(3.960)also,(R2) of group(B) but from third class and Least square means(2.618) in spite of, (R3) from second class with (A and B) with least square means(2.806). Otherwise, means Spike length(cm) replication influence indicated that same influence and same group (A) that (R1, R2 and R3) means values (7.861,7.449 and 6.361) consequently. Later LS means Number of grains per spike grouped to (2) group (A and B) but R1in the first effect with least square means (29.859) on the other hand R2classified from group (A and B) with mean value (24.205) however, R3 effect grouped from (B)with mean value (21.975). next replication effect classified according to mention figure LS means number of spikes per plant weight shows that effect grouping in the same group (A) but R3 from top influence with mean value (2.732) and R1 from second grade effect with mean value (2.659) also, R2 with third answer and mean record value (2.533), later least square means grain yield per plant in gram replication effect classified to (2) two group (A and B) , the first order of R1 with mean value (2.603) but R3 from second order and mean value (2.159) but with group(A and B) also, R2 from third grade with mean value (1.951 and B group),finally least square means of harvest index with one group A but

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classifieds effect of replication to R1 first order and mean value (0.547) ,after R3 with mean value (0.546) and last replication R2 with mean value (0.507).

Table 13. Correlation matrix (Pearson) of parameters and effects on wheat growth and yields

Parameters	Biology. yield/ plant(g)	1000-grain weight(g)	Weight of spikes /plant(g)	Spike length (cm)	No. of grains/ spike	No. of spikes /plant Weight	Weight of grains/ spike(g)	Grain yield /Plant(g)	Harvest I.
Biology. yield/ plant(g)	1								
1000-grain weight(g)	0.792	1							
Weight of spikes /plant(g)	0.918	0.719	1						
Spike length (cm)	0.889	0.842	0.874	1					
No. of grains/ spike	0.825	0.696	0.910	0.832	1				
No. of spikes /plant Weight	0.778	0.570	0.646	0.663	0.423	1			
Weight of grains/ spike(g)	0.880	0.783	0.931	0.861	0.953	0.492	1		
Grain yield /Plant(g)	0.944	0.776	0.944	0.824	0.866	0.731	0.874	1	
Harvest I.	0.514	0.485	0.640	0.449	0.632	0.458	0.546	0.748	1
Values in bold are different from 0 with a significance level alpha=0.05									

Different wheat growth and yield characteristics were indicated for the correlation between various uses which explained in correlation (table 13) which shows positive correlation between biological yield and thousand grain weight (g) and significant (R) value of (0.792) and same significant value with Weight of spikes per plant(g) with (R)value(0.918) but and thousand grain weight(g) with Weight of spikes per plant(g) and value(0.719) in spite of positive correlation between biological yield and Spike length (cm) with value of(0.889)also positive significant value with thousand grain weight(g) and Weight of spikes per plant(g) with biological yield with values (0.842 and 0.872) respectively, later positive significant value number of grains per spike with each of biological yield , thousand grain weight(g), Weight of spikes per plant(g) , and Spike length (cm) with values (0.825,0.696, 0.910, and 0.832) respectively, on the other hand

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number of spikes per plant Weight that indicated positive significant values with biological yield , thousand grain weight(g), and Weight of spikes per plant(g) , with values (0.778, 0.579 and 0.646) but no significant with Spike length (cm) and value (0.423),whether , Weight of grains per spike(g)that correlation indicated positive significant value with each of biological yield , thousand grain weight(g), Weight of spikes per plant(g) , Spike length (cm),and number of spikes per plant Weight with record values (0.880,0.783,0.931,0.861,0.953 and 0.492) respectively, later Grain yield per Plant(g) correlation table 4 indicated that positive significant value with each of biological yield , thousand grain weight(g), Weight of spikes per plant(g) , Spike length (cm), number of spikes per plant, and Weight of grains per spike(g) with values of(0.944,0.776,0.944,0.824,0.866,0.731 and 0.874), finally, Harvest index indicated that significant values with biological yield , thousand grain weight(g), Weight of spikes per plant(g) number of spikes per plant, and Weight of grains per spike(g)values (0.514,0.485,0.640,0.632,0.546 and 0.748) but no significant values with Spike length (cm) and number of spikes per plant Weight(0.449and 0.458) respectively.

4. CONCLUSION

According to the findings of the current study, interaction of poultry with chemical fertilizer with value (5.313) treatment is the most effective with same effect with chemical (5.833) and poultry (4.838) when, compared to the other treatments It produced the highest grain production, biological yield, and grain. Manure is a fertilizer source for agricultural output; also, other applications of poultry, chemical fertilizer, Animal manure with chemical fertilizer interaction and Animal manure organic fertilizer respectively each of parameters or applications compared with control treatment and for replications, replication one (1) from the first with value (4.517) and replications three (3) and two (2) respectively with least square means values (3.843, 3.780). It can be concluded that the application of manure fertilizer when mixed and individually have positive impact on the growth and yield of Wheat.

REFERENCES

Abbas, G., Khattak, J. Z. K., Mir, A., Ishaque, M., Hussain, M., Wahedi, H. M., & Ullah, A. (2012). Effect of organic manures with recommended dose of NPK on the performance of wheat (Triticum aestivum L.). J. Anim. Plant. Sci, 22(3), 683-687.

Agbede, T.M., S.O., Ojeniyi and Adeyemo, A.J., (2008). Effect of poultry manure on soil physical and chemical fertilizer properties, gowth and grain yield of sorghum in southwest, nigeria. AmEura. J. Sustain. Agric., 2: 72-77.

 DOI : https://doi.org/10.55173/agriscience.v6i2.99

Vol. 6 No. 2 March 2023
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Available on :
https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Ali, M. S., and Manea, A. I., (2018). Effect of seeds size and organic fertilization on some traits of vegetative growth, quantitative and qualitative yield for the potato (Solanum tubersoum L.). Euphrates Journal of Agriculture Science, 10(4).

Amanullah K (2014a). Wheat and rye differ in dry matter partitioning, shoot-root ratio and water use efficiency under organic and inorganic soils. J. Plant Nutr. 37:1885-1897.

Amanullah K (2015a). Competition among warm season C4-cerealsinfluence WUE and competition ratios. Cogent Food Agric.1:1011466.

Amanullah K (2015b). Specific leaf area and specific leaf weight in small grain crops wheat, rye, barley, and oats differ at various growth stages and NPK source. J. Plant Nutr. 38(11):1694-1708.

Amanullah K, Stewart BA, Hidayatullah (2015). Cool season C3-grasses (Wheat, Rye, Barley, and Oats) differ in shoot: Root ratio when applied with different NPK sources. J. Plant Nutr. 38:1890-201.

Amanullah, K., Lal, K.A. and Khalid, N., (2017). Impact of variable NPK source on water use efficiency and growth rates of winter grasses (cereals): Wheat, rye, barley and oats. African Journal of Agricultural Research, 12(49), pp.3421-3432.

Awad, M., Al Solaimani, S.G. and El-Nakhlawy, F.S., (2014). Effect of integrated use of organic and mineral fertilizer on some quality parameters of maize (Zea mays L.). International Journal of Innovation and Scientific Research, 9(2), pp.228-236.

Biesaga-kościelniak, j., ostrowska, a., filek, m., dziurka, m., waligórski, p., mirek, m. & kościelniak, j. (2014). Evaluation of spring wheat (20 varieties) adaptation to soil drought during seedlings growth stage. Agriculture,4, 96-112.

Blay, E.T., E.Y. Danquah, A.J. Ofosu and J.K. Ntumy.(2002). Effect of poultry manure on the yield of shallot. Advances in Horticultural Sciences 16: 13-16.

Bruce A., Linquist .,VongvilayP., .P., (2007) Benefits of organic residues and chemical fertilizer to productivity of rain-fed lowland rice and to soil nutrient balances, Nutr Cycl Agroecosyst 79:59–72.

Chastain, J.P., J.J. Camberato and J.E. Albrecht. (2001). Nutrient content of livestock and poultry manure, climate change central, Clemson University, USA. 36p.

Choudhary, L., Singh, K. N., Gangwar, K., and Sachan, R. (2022). Effect of FYM and Inorganic fertilizers on growth performance, yield components and yield of wheat (Triticum aestivum L.) under indo-gangetic plain of Uttar Pradesh. The Pharma Innovation Journal, 11(4), 1476-1479.

Costa C, Dwyer LM, Zhou X, Dutilleul P, Hamel C, Reid LM, Smith DL (2002). Root morphology of contrasting maize genotypes. Agron. J. 94:96-101.

Cui, Z.L., Zhang, F.SX.P., Chen, Y.X., Miao, J.L., Li, L.W., Shi, J.F., Xu, Y.L., Ye, C.S., Liu, Z.P., Yang, Q., Zhang, S.M., Huang and D.J. B., (2008). On-farm evaluation of an in-season nitrogen management strategy based on soil NMIN test. Field Crops Research 105: 48-55.

 DOI : https://doi.org/10.55173/agriscience.v6i2.99

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https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Das, K., Dang, R., Shivananda, T. N., Şekeroğlu, N., (2007). Comparative Efficiency of Bio- and Chemical fertilizer Fertilizers on Nutrient Contents and Biomass Yield in Medicinal Plant Stevia rebaudiana Bert. International Journal of Natural and Engineering Sciences, 1: 35-39.

Foulkes, M. J., Slafer, G. A., Davies, W. J., Berry, P. M., Sylvester, B. R., Martre, P., Calderini, D. F., Griffiths, S., & Reynolds, M. P., (2010). Raising yield potential of wheat. III. Optimizing partitioning to grain while maintaining lodging resistance. Journal of experimental botany, 62, 469-486.

Gu, S., Zalucki, M. P., Men, X., Li, J., Hou, R., Zhang, Q., ... and Ouyang, F., (2022). Organic fertilizer amendment promotes wheat resistance to herbivory and biocontrol services via bottom-up effects in agro ecosystems. Journal of Pest Science, 95, 339-350.

Hariyadi, B. W., Ali, M., & Pratiwi, Y. I. (2018). Effect of Organic Liquid Fertilizertambsil On The Growth and Resultskale Crop Land (Ipomoea Reptans Poir). *AGRICULTURAL SCIENCE*, *1*(2), 49–60.

He, H., Peng, M., Lu, W., Hou, Z., and Li, J., (2022). Commercial organic fertilizer substitution increases wheat yield by improving soil quality. Science of The Total Environment, 851, 158132.

Heemstra, P.C., and Randall, J.E., 1993. Groupers of the world. FAO Fisheries synopsis, 16(125), p.I.

Hemmati, M. H., and Soleymani, A., (2014). A study about drought stress effects on grain yield components of three sunflower cultivars, international journal of Advanced Biological and Biomedical Research., Volume 2, Issue 3, 2014: 597-600.

Horn, R., Taubner, H., Wuttke, M., & Baumgartl, T. (1994). Soil physical properties related to soil structure. Soil and Tillage Research, 30(2-4), 187-216.

Jassim, A. H. and Mohammed, R.H. (2019). Effect of compound NPK and foam sulfur fertilizer levels and ascorbic acid spraying on growth and yield of sweet corn. Ecology, Environment and Conservation 25(4): 412-417.

Khaliq, T., T. Mahmood, J. Kamal and A. Masood. (2004). Effectiveness of farmyard manure, poultry manure and nitrogen for corn (Zea mays L.) productivity. International Journal of Agriculture and Biology 6:260-263.

Kumar, R., & Pareek, B. L. (2022). Effect of organic manure, Azospirillum and inorganic fertilizer on growth and yield of wheat (Triticum aestivum) L.). PharmaJournal, 11(2), 2179-2183.

Lambers H (1987). Does variation in photosynthetic rate explain variation in growth rate and yield. Netherlands J. Agric. Sci. 35:505519.

Maurya, K. L., Pandey, A. K., Anshuman, K., Yadav, S.,and Chauhan, S. (2022). Impact of Rice Residue Management Practices on Growth and Productivity of Wheat (Triticum aestivum L.). International Journal of Plant & Soil Science, 34(24), 1084-1092.

 DOI : https://doi.org/10.55173/agriscience.v6i2.99

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https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Monedero, S.M., C. Mondini, M. Nobili, L., Leita, and A. Roig., (2004). Land application of biosolids. Soil response to different stabilization degree of the treated organic matter. Waste Management 24: 325-532.

Moradi, a., kordlaghari, k. P., and keshavarz, K., (2015). Influence of Zinc and Seed Inoculation with Rhizobium Bacteria on Yield and Yield Components of Triticum aestivum (Case study: Nurabad, Iran). Biological Forum. Citeseer, 7 (1):

Shahid, M., Saleem, M.F., Khan, H.Z., Wahid, M.A., and Sarwar, M., (2015). Improving wheat (Triticum aestivum L.) yield and quality by integration of urea with poultry manure. Soil & Environment, 34(2).

Sharma H., Kumar A. (2011). Effect of plant growth regulators and chemical fertilizer fertilizers on growth and productivity of Chlorophytum tuberosum and Pergularia daemia. Journal of Medicinal Plants Research. 5: 2647-2651.

Sirohiya, A., Kumar, A., Pathak, R. K., Sachan, R., Tiwari, A., Nema, S., ... & Singh, A. K. (2022). Effect on organic manure and inorganic fertilizers on productivity parameters and quality traits of wheat (Triticum aestivum L.) under central plain zone of Uttar Pradesh. Int J Environ Clim Change, 12(11), 1197-202.

Šramková, z., gregová, e., and sturdy, E., (2009). Chemical fertilizer composition and nutritional quality of wheat grain. Acta Chimica Slovaca, 2, 115-138.

Upadhyay, A. K., Bhayal, L., Tagore, G. S., Kulhare, P. S., & Bhayal, D., (2022). Effect of Soil Test Crop Response Based Long-Term Fertilization on Yield Attributing Parameters and Yield of Wheat (Triticum aestivum L.) . International Journal of Environment and Climate Change, 2330-2336.

Wang, C., Ma, H., Feng, Z., Yan, Z., Song, B., Wang, J., ... & Wang, Y. (2022). Integrated organic and inorganic fertilization and reduced irrigation altered prokaryotic microbial community and diversity in different compartments of wheat root zone contributing to improved nitrogen uptake and wheat yield. Science of the Total Environment, 842, 156952.

Yadav, A. S., Tiwari, A., Pandey, H. P., Sachan, R., Kumar, A., Pathak, R. K., & Verma, H. (2022). Effect of Integrated Nutrient Management on Growth Parameters, Yield Components and Yield of Wheat (Triticum aestivum L.) under Central Plain Zone of Uttar Pradesh. International Journal of Plant & Soil Science, 34(23), 1050-1057.

Zhang S.Q., Zhang F.D., Liu X.M., Wang Y.J., Zou S.W., He X.S. (2005): Determination and analysis on main harmful composition in excrement of scale livestock and poultry feedlots. Plant Nutrition and Fertilizer Science, 11: 822–829. (In Chinese).

Ahmed, H. G. M. D., Fatima, N., Faisal, A., Ullah, A., Ali, M., Ameen, M., ... & Imran, M. (2023): Characterization of Bread Wheat Genotypes Using Spike Related Traits for Sustainable Yield Potential. Journal of Applied Research in Plant Sciences, 4(01), 469-476.

 DOI : https://doi.org/10.55173/agriscience.v6i2.99

ISSN : 2597 - 8713 (ONLINE)
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https://agriculturalscience.unmerbaya.ac.id/index.php/agriscience/index

Zhang, Y. P., Li, X., He, H. J., Zhou, H., Geng, D. Y., & Zhang, Y. Z. (2023): Effects of Rotational Tillage on Soil Physicochemical Properties and Crop Yield in a Rice–Wheat Double Cropping Area. Sustainability, 15(1), 474.

Oumata, S., Monneveux, P., Zaharieva, M., Mekliche-Hanifi, L., & David, J. (2023): Variation of morphological traits among wheat (Triticum aestivum L.) landraces from two regions of the Algerian Sahara. Potential interest for wheat breeding. Genetic Resources and Crop Evolution, 70(1), 235-250.

Afzal, m., khalid, m., imtiaz, m., nasir, b., shah, s., nawaz, m., ... & maqbool, r. (2023): Selection of drought tolerant wheat genotypes based on mean performance and biplot ANALYSIS. Biological and Clinical Sciences Research Journal, 2023(1), 188-188.

Pan, J., Miao, Q., Zhang, W., Wang, H., Wang, W., Xue, Y., ... & Cui, Z. (2023): Increasing Soil Organic Carbon for Higher Wheat Yield and Nitrogen Productivity. Agronomy, 13(1), 198.

Ashour, E. H., Afify, A. H., Mehesen, A. A., Zaki, R. M., & El-Sawah, A. M. (2023): Response of wheat to cyanobacteria and compost tea applications as a tool to achieve bio-organic farming concept.

Jat, R. A., Jain, N. K., Yadav, R. S., Reddy, K. K., Choudhary, R. R., Zala, P. V., & Jha, P. K. (2023): System-Based Integrated Nutrient Management Improves Productivity, Profitability, Energy Use Efficiency and Soil Quality in Peanut-Wheat Cropping Sequence in Light Black Soils. Sustainability, 15(2), 1361.

Singh, M., & Chaturvedi, P. K. (2023): Sowing methods and nitrogen levels effect on growth, yield and economics of wheat (Triticum aestivum L.).

 DOI : https://doi.org/10.55173/agriscience.v6i2.99