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EFFECT OF POULTRY MANURE FERTILIZER AND DRY YEAST ON SEED YIELD CHARACTERISTICS OF TWO BEAN VARIETIES

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ABSTRACT

The study was carried out in the vegetable research experimental field of the Department of Horticulture and Landscape design /College of Agriculture and Forestry/University of Mosul/Touristic Forest Area, during the growing season spring 2023. Two types of imported bean seeds were used in the experiment: the first Iranian variety and the second Argentinian variety. The second factor was organic fertilizer, poultry waste, at three levels (0, 1, and 2) tons/donum, and the third factor was dry baker's yeast, which included three concentrations of dry yeast at (0,5,10 g/L). Data were recorded on the following characteristics: number of seeds per pod, weight of 100 seeds (g), length and diameter of the seed (cm), number of seeds per plant, seed yield per plant (gm), seed yield per unit area (kg/dunum). The level of 2 tons per dunum of poultry manure achieved the highest length and diameter of the seed and the number of seeds per plant. The best results were when spraying beans at a concentration of 10 grams per liter of dry yeast for traits of number of seeds per pod, the weight of 100 seeds, and the length and diameter of the seed at a concentration of 5 grams per liter of yeast, the highest value was achieved significant in the characteristics of the number of seeds per plant. The double interaction between poultry waste fertilizer 2 tons per dunum and 0 gm each of dry baker's yeast resulted in the highest seed yield for the plant, while the double interaction treatment between poultry waste fertilizer 2 tons per dunum and the variety achieved the best significant results for the traits. Weight of 100 seeds and length of seed diameter.

INTRODUCTION

Phaseolus bean is one of the plants in the Fabaceae family. Its scientific name is (Phaseolus vulgaris L.), and South America is its original homeland (Hassan et al., 2003). The bean plant is grown in Iraq in two dates (two shoots). The first date is during the spring season for the period from the month of March, and the plant completes its life cycle until the end of June, where it produces green pods and its seeds mature during this shoot. The second date is planted in the fall. Dry bean seeds are a popular food around the world and an important source of protein, vitamins, calories, fiber, and minerals (Akcin, 1988). Varieties and genotypes of beans also vary in many characteristics of seed yield and quality. Organic fertilization is one of the important methods for supplying plants with the nutrient needs without any negative impact on the environment. Studies conducted by Cook (1972) confirmed that organic fertilizers work to improve soil characteristics. This improvement leads to increased water readiness for the plant, improves water seepage and aeration, and encourages growth by providing pore sizes. Most studies have emphasized the

importance of adding organic matter to the soil for its main role in improving various physical, chemical, and biological soil characteristics, such as soil structure, aeration, water permeability, root penetration, and increasing Their exchange capacity, microorganism activity and increase in number, as well as improving their regulatory capacity and increasing their readiness for nutrients. Animal fertilizers of various types constitute an important source of added organic matter. The use of poultry manure improves the growth of horticultural crops (Boateng *et al*. 2006).

Many studies and research have indicated that yeast is a natural source of cytokinins and has stimulating effects on plant growth (Amer, 2004), and yeast extract has a major role during the stages of vegetative and reproductive growth by improving flowering in some vegetative plants because it contains auxins and carbohydrate accumulation (Barnett *et al.*, 1990). It works, activates and stimulates cell division and elongation, protein and DNA synthesis, and chlorophyll formation (El-Desouky *et al*., 1998, and Wanas, 2002). Yeast contains sugars and proteins in addition to amino acids and many vitamins (Mahmoued, 2001). Sardana *et al*. (2000) in India indicated that the varieties of beans used for cultivation differ according to the growing regions, and that the superiority of the variety The VL 63 variety gives the highest seed yield. From the study conducted by Sicard *et al.*, (2005) to evaluate genetic diversity in beans, they studied (23) genetic combinations and found that these combinations differed among themselves in the seed weight of the plant. Harmankaya *et al*. (2008) mentioned their evaluation of six bean genotypes. Their results showed that there were clear significant differences between the varieties in the number of seeds per pod and the weight of 100 seeds. Iqbal *et al.,* (2010) indicated that the bean varieties studied differed among themselves in the number of pods per plant, the number of seeds per pod, the weight of (100) seeds, and the dry seed yield. Arunga *et al*. (2010) in Kenya, in their study of (25) bean genotypes, indicated that these genotypes differed among themselves in the number of pods per plant. When they evaluated (17) bean genotypes, Palmero *et al*. (2011) found that they differed significantly among themselves in terms of seed length and diameter and weight of 100 seeds. The results of Kazemi *et al*. (2012) in Iran and on two varieties of white beans showed the significant superiority of the Shokofa variety in seed yield/plant and seed yield (kg/ha) over the Danshekadeh variety, and they did not differ significantly between them in the number of seeds/pod and the average weight of 1000 seeds.

Sing *et al.,* (2012) indicated in their study to evaluate six bean genotypes (VRW32, ICA Pijao, ICA Bunsi, VCW 54, G122, Othello) that they differed significantly from each other in the weight of 100 seeds, as the Othello genotype was superior in this trait. When Mulugeta *et al.* (2013) evaluated (36) genotypes of beans in Ethiopia, they noticed significant differences between the genotypes in the characteristics of both the number of seeds per pod and the weight of 100 seeds. Joseph *et al*., (2014) showed that there is a significant difference between the genotypes of beans in the characteristics of the number of seeds per pod and seed yield. Kamfwa *et al*. (2015) obtained through their evaluation of (37) bean genotypes that the combinations showed significant differences in the weight of 100 seeds, the number of pods per plant, the number of seeds per plant, and seed yield per plant per hectare. Bagheri *et al.,* (2017) noted, when evaluating and performing (9) bean genotypes, that the genotypes differed among themselves in terms of the number of seeds per pod and the weight of (100) seeds. Esho (2019) obtained, through his study of (12) bean genotypes, that they differed significantly among themselves in the number of seeds per pod, the length and diameter of the seed, the weight of (100) seeds, and the yield of dry seeds per unit area. Jasim and Esho (2020) showed, in their study of (12) genetic compositions of beans, that they differed significantly among themselves in the characteristics of the number of seeds per pod, the weight of 100 seeds, the seed yield per plant, and the seed yield per hectare. Eberechi (2018) occurred in Nigeria , when fertilizing bean plants with organic and inorganic fertilizers. Poultry waste fertilizer was used at concentrations (0, 2.5, 5, 7.5, and 10 tons/ha), which caused significant increases in the seed yield of the plant. Elka and Mariam (2020) indicated that when fertilizing the bean plant with organic fertilizer represented by croton and Erythrina at a concentration of (1:2), organic fertilizers were added with (zero, 2.5, 5) tons/ha and NPS fertilizer at concentrations (0 ,

50 , 100 ,150) kg/ha. The results showed that there were significant increases in seed yield.. Ahmad and Arain (2021) indicated in Afghanistan through their study of the response of the local bean plant, where When using organic fertilizer (poultry waste) at levels (0, 5 and 10 tons/ha), the organic fertilizer had a significant effect on the characteristics of the number of seeds per pod in addition to the weight of (100 seeds) and the total seed yield.

METHODOLOGY

The study was carried out in the vegetable research experimental field of the Department of Horticulture and Landscape Engineering/College of Agriculture and Forestry/University of Mosul/Touristic Forest Area, during the spring agricultural season of 2023. The field was manually divided by means of a surveyor into experimental units (Expermental units), which included two (1.5) long rows. And a width of 1.5 m. The study included the impact of three factors: The first factor: the effect of the variety. Two varieties of imported bean seeds were used in the experiment, the first Iranian variety and the second Argentine variety. The second factor was organic fertilizer, poultry waste, at three levels, namely (0, 1, and 2) tons/acre, and the third factor included dry bread yeast. Three concentrations of baking yeast fertilizer (0, 5, 10 g/l). Seeds for two varieties of beans were planted directly in the field in the second week of March (3/16/2023) at a distance of (15 cm) between one plant and another and on a bed, and the distance between one bed and another was (75 cm) (Matlob *et al.*, 1989). Planting was done on both sides of the bed. With a length of (1.5 m) for one garden, one experimental unit consists of two gardens, and the number of gardens for each garden is (20 gardens), and the number of plants for each experimental unit (treatment) is (40 plants), and the area of the experimental unit is (2.25 m2). The study is organized in a completely randomized block design with a split system. The inhaler, with three replicates for each experimental unit, thus we have (3 All experimental units were fertilized uniformly with chemical fertilizer, adding 80 kg of triple superphosphate fertilizer per dunum, 75 kg of urea fertilizer per dunum, and 50 kg of potassium per dunum (Matloub et al., 1989). All organic fertilizers were added a week before planting, and a yeast concentrate was added Three batches, the first after the appearance of the true leaf, the second spraying 20 days after the first spraying, and the third after 20 days of spraying. Data were recorded on the following characteristics: number of seeds per pod, weight of 100 seeds (g), length and diameter of the seed (cm), number of seeds per pod. Plant, seed yield per plant (gm), seed yield per unit area (kg/dunum), the data were analyzed using the program (SAS, 1999), and the averages of the traits were compared for the Duncan multinomial test at the 5% probability level (Al-Rawi and Khalaf Allah, 2000).

RESULTS AND DISCUSSION

From table (1) appears that the three individual factors and the interaction between them had a significant effect on the number of seeds per pod, as the fertilization treatment (1) ton/dunum of organic fertilizer and poultry waste achieved the highest number of seeds, amounting to (4,011) seeds. It differed significantly. At the levels (0 and 2) tons/dunum of organic fertilizer and poultry waste, the spraying treatment with a concentration of (10) g/liter of dry baking yeast achieved the highest number of seeds per pod, amounting to (3.991) seeds, and it was significantly superior only when spraying with (5) was used. 1 g/liter of yeast amounted to (3.854) seeds per pod. As for the effect of the binary interaction between (1) ton/dunum of organic fertilizer and poultry waste with (10) gm/liter dry baking yeast, it achieved the highest number of seeds per pod of (4.10) and was significantly superior to the dual interaction treatment between (0) tons. One dunum of organic fertilizer, poultry waste, with (5) gm/liter of dry baking yeast amounted to (3.665) seeds.

Table (1) effect of organic fertilizer, yeast, varieties, and their interaction on the number of seeds per pod during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	3.7333 abc	3.9667 abc	3.8500 b
	5	3.400 c	3.9300 abc	3.6650 b
	10	3.7433 abc	4.0233 abc	3.8833 b
1.5	0	3.8200 abc	4.3467 a	4.0833 a
	5	3.6300 c	4.0667 abc	3.8483 b
	10	4.0900 ab	4.1100 ab	4.1000 a
2	0	3.8100 abc	3.8667 abc	3.8383 b
	5	3.8567 abc	4.2433 abc	4.0500 a
	10	4.0233 abc	3.9567 abc	3.9900 b
Organic x variety		Iranian	Argentina	Organic fertilizer
0		3.6256 a	3.9733 a	3.7994 b
1.5		3.8467 a	4.1744 a	4.0106 a
2		3.8967 a	4.0222 a	3.9594 b
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		3.7878 b	4.0600 a	3.9239 a
5		3.6289 b	4.0800 a	3.8544 b
10		3.9522 b	4.0300 a	3.9911 a
Variety		3.78963 a	4.05667 a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

The effects of the bilateral interaction between the three levels of organic fertilizer with the two types of beans did not have any significant effect on this trait. The double interaction treatments between the three yeast concentrations and the Argentine variety also achieved the highest number of seeds per pod, and these interactions exceeded the double interaction treatment of the three yeast levels with the Iranian variety. As shown from table (1), the triple interaction treatment between (1) ton/dunum of Organic fertilizer, poultry waste, with (0) g/L dry yeast. With the Argentine variety, the highest number of seeds per pod reached (4,347) seeds, and it significantly outperformed some of the triple interaction treatments. While the lowest number of seeds per pod came as a result of the triple interaction between (0) tons/dunum of organic fertilizer, poultry waste, with (5) g/liter dry yeast, the Iranian variety, reached (3.40) seeds per pod.

Table (2) shows that the three levels of organic fertilizer did not significantly affect the weight of (100) seeds and effect of organic fertilizer, yeast, varieties, and the interaction between them on the weight of (100) seeds (g) during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	31.667 ab	33.333 ab	32.500 b
	5	34.000 ab	32.667 ab	33.333 ab
	10	32.667 ab	35.333 ab	43.000 a
1.5	0	34.667 ab	32.000 ab	33.333 ab
	5	31.667 ab	32.667 ab	32.167 bc
	10	36.333 a	34.000 ab	35.167 a
2	0	30.333 b	32.667 ab	31.500 c
	5	32.333 ab	35.333 ab	33.833 ab
	10	35.000 ab	34.667 ab	34.833 a

Organic x variety	Iranian	Argentina	Organic fertilizer
0	32.778 b	33.778 b	33.2778 a
1.5	34.222 a	32.889 b	33.5556 a
2	32.556 b	34.222 a	33.3889 a
Dry yeast x variety	Iranian	Argentina	Dry yeast
0	32.222 a	32.667 a	32.4444 c
5	32.667 a	33.556 a	33.1111 b
10	34.667 a	34.667 a	34.6667 a
Variety	33.1852 a	33.6296 a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

As for the three yeast concentrations, the spraying treatment with (10) grams/liter of dry baking yeast achieved the highest weight of (100) seeds, reaching (34.667) grams. It was significantly superior to the other two concentrations of yeast. As for the varieties, it appears from table (2) that the weight of (100) seeds was not significantly affected by the difference between the two varieties. As for the effect of the binary interaction between the levels of organic fertilizer, poultry waste, and yeast concentrations, it had a significant effect on this trait, as the highest seed weight (100) was the result of the interaction of the effect of (1) ton/dunum of organic fertilizer, poultry waste, with (10) gm/liter of bread yeast. Dry, which amounted to (35,167) grams, and the lowest weight came as a result of the bilateral interaction between (2) tons/acre of organic fertilizer and poultry waste with (0) grams/liter of dry baking yeast, which amounted to (31,500) grams. It appears from table (2) that the bilateral interaction treatment between (1) ton/acre of organic fertilizer and poultry waste with the Iranian variety achieved the highest significant weight for the weight of (100) seeds, which amounted to (34.222), and the lowest weight for this trait came as a result of the bilateral interaction between (1) ton/dunum of organic fertilizer, poultry waste, with the Iranian variety, which amounted to (32,778) grams.

It appears from table (2) that the concentrations of the three yeast overlapping with the two varieties did not reach the level of significance for the weight of (100) seeds for Duncan's multinomial test at the probability level (5%). As for the effect of the triple interaction between the factors under study, it had a significant effect on this. The characteristic is that the triple interaction treatment between (1) ton/dunum of organic fertilizer and poultry waste with (10) g/liter of dry baking yeast with the Iranian variety achieved the highest weight of (100) seeds reaching (36.333) g. The lowest weight came from the effect of the interaction. The trio between (2) tons/dunum of organic fertilizer, poultry waste, (0) g/liter of dry baking yeast and the Iranian variety, amounted to (30.333) g.

Table (3) shows that using (2) tons/acre of organic fertilizer and poultry waste achieved the highest significant seed length of (1.355) cm, and the lowest length came as a result of fertilizing (1) ton/acc of organic fertilizer from poultry waste, which reached (1.315) cm. The spraying treatment with a concentration of (10) g/L also outperformed dry baking yeast and gave the highest seed length of (1.358) cm. As for the varieties, the Argentine variety outperformed the Iranian variety in terms of seed length, reaching (1,363 and 1,313) cm, respectively. The binary interaction treatment between (2) tons/dunum of organic fertilizer and poultry waste with (10) g/liter dry baking yeast also achieved the highest seed length of (1.393) cm. It differed significantly with most of the binary interactions, but it did not differ significantly with the binary interaction between (0 1 ton/dunum of organic fertilizer, poultry waste, and (10) gm/liter of dry baking yeast. As for the binary interaction between the levels of organic fertilizer, poultry waste, and the varieties, the bilateral interaction treatment was achieved between (2) tons/dunum of organic fertilizer, poultry waste, with the Argentine variety. The highest seed length reached (1,398) cm, and the lowest seed length came as a result of the bilateral interaction between treating (1)

ton/dunum of organic fertilizer and poultry waste with the Iranian variety, as it reached (1,300) cm.

There was also no significant effect of the bilateral interaction between the three concentrations of dry baking yeast with the two types of beans. We also find from Table (18) that the triple interaction treatment between (2) tons/dunum of organic fertilizer and poultry waste with (10) g/liter dry baking yeast with the Iranian variety achieved the highest significant seed length of (1.447) cm, and the lowest length came as a result of The triple interaction between (1) ton/dunum of organic fertilizer, poultry waste, (5) g/liter dry yeast, and the Iranian variety reached (1.274). It appears from Table (4) that the fertilizer treatment (2) tons/dunum of organic fertilizer and poultry waste achieved the highest seed diameter, which reached (0.690) cm, and was only significantly superior to the comparison treatment (0) without fertilization, which reached (0.674) cm. The spray treatment with a concentration of (10) g/L dry yeast achieved the highest seed diameter, which reached (0.692) cm,

Table (3) The effect of organic fertilizer, yeast, varieties, and their interaction on seed length (cm) during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	1.30400 ab	1.34533 ab	1.32467 b
	5	1.35633 ab	1.32833 ab	1.34233 b
	10	1.32200 ab	1.40733 ab	1.36467 a
1.5	0	1.31300 ab	1.30967 ab	1.31133 b
	5	1.27400 b	1.35967 ab	1.31683 b
	10	1.31200 ab	1.3267 ab	1.31633 b
2	0	1.28867 ab	1.37833 ab	1.33350 b
	5	1.30633 ab	1.36867 ab	1.33750 b
	10	1.33933 ab	1.44733 a	1.39333 a
Organic x variety		Iranian	Argentina	Organic fertilizer
0		1.32744 b	1.36033 a	1.34389 a
1.5		1.9967 c	1.33000 b	1,31483 b
2		1.31144 b	1.39811 a	1.3478 a
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		1.3189 a	1.34444 a	1.32317 b
5		1.31222 a	1.35222 a	1.33222 b
10		1.32444 a	1.39178 a	1.35811 a
Variety		1.31285 b	1.36281 a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

and was superior only to the treatment without spraying (0), which reached (0.665) cm. While the two varieties did not have any significant effect on seed diameter. As for the effect of the binary interaction between (2) tons/dunum of organic fertilizer and poultry waste with (10) gm/liter dry baking yeast, it achieved the highest seed diameter of (0.697) cm and differed significantly only with the binary interaction treatment between (0) tons/ A dunum of organic fertilizer, poultry waste, and (0) gm/liter of dry baking yeast reached (0.638) cm, and with the double interaction treatment between (1) ton/acre of organic fertilizer, poultry waste, and without spraying yeast, (0) gm/liter reached (0.675). cm. There was also no significant effect of the effect of the binary interaction between the three levels of organic fertilizer and poultry waste with the two varieties. The same result was obtained for the effect of the binary interaction between the concentrations of yeast and the varieties. The triple interaction treatment between (2) tons/dunum of organic fertilizer and poultry waste with (10) g/liter dry baking yeast and the Iranian variety achieved the

highest seed diameter of (0.709) cm. While the smallest seed diameter came as a result of the triple interaction between (0) tons/acre of organic fertilizer, poultry waste, and (0) gm/liter. Dry bread yeast with the Iranian variety reached (0.622) cm

Table (4) effect of organic fertilizer, yeast, varieties, and their interaction on the seed diameter (cm) during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	0.62200 b	0.65400 ab	0.63800 b
	5	0.70200 ab	0.67200 ab	0.68700 ab
	10	0.69967 ab	0.69167 ab	0.69567 a
1.5	0	0.70400 ab	0.64633 ab	0.67567 b
	5	0.68300 ab	0.68533 ab	0.67517 ab
	10	0.69100 ab	0.67633 ab	0.68417 ab
2	0	0.68200 ab	0.68300 ab	0.68250 ab
	5	0.69667 ab	0.68633 ab	0.69150 a
	10	0.070867 a	0.68533 ab	0.69700 a
Organic x variety		Iranian	Argentina	Organic fertilizer
0		0.67456 a	0.672569 a	0.674 a
1.5		0.69267 a	0.669339 a	0.67356 a
2		0.69578 a	0.68489 a	0.69033 a
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		0.66933 a	0.66111 a	0.66522 b
5		0.69389 a	0.68122 a	0.68756 a
10		0.69978 a	0.68444 a	0.69211 a
Variety		0.68767 a	0.67559 a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

Table (5) showed that the highest number of seeds per plant occurred when fertilizing with (1) ton/dunum of organic fertilizer and poultry waste, and it amounted to (84,332) seeds per plant, and it was significantly superior to the treatment without fertilization (0), which amounted to (72,652). A seed for each plant. The concentration (5) gm/L also achieved the highest number of seeds per plant, which reached (81,078) seeds per plant, and it differed significantly only with (10) gm/L dry baker's yeast, which amounted to (51,578) seeds. While the Argentine variety outperformed the Iranian variety in terms of the number of seeds per plant, reaching (86,039 and 75,961) seeds per plant, respectively. The double interaction treatment between (2) tons/acre of organic fertilizer, poultry waste, and (10) gm/liter dry baking yeast achieved the highest number of seeds per plant, reaching (91.73), and it differed significantly with some of the double interaction treatments, while the number of seeds was the lowest. Which was (71.84) and came as a result of the bilateral interaction between (0) tons/dunum of organic fertilizer and poultry waste with (10) grams/liter of dry baking yeast. The double interaction treatment between (2) tons/acre of organic fertilizer and poultry waste with the Argentinean variety achieved the highest number of seeds per plant, reaching (91,312) seeds, and it was significantly superior to some of the double interaction treatments. The lowest number of seeds was (67,796) seeds per plant. A plant for the effect of the bilateral interaction between (0) tons/acre of organic fertilizer and poultry waste with the Iranian variety.

As for the effect of the two-way interaction between the three yeast concentrations and the two types of beans, it did not reach the level of significance for this characteristic. Also, the triple interaction between the three studied factors did not have any significant effect on the number of seeds per plant. It appears from Table (6) that the three individual factors did not significantly

affect the seed yield characteristic of each plant. As for the double interaction treatment between (1) ton/dunum of organic fertilizer and poultry waste with (0) g/liter dry baking yeast, it achieved the highest seed yield per plant amounting to (0.0282) and differed significantly with part of the double interaction treatments between (0) tons. /dun of organic fertilizer, poultry waste, and (5) g/liter of dry baking yeast, which amounted to (0.0238). Also, the bilateral interaction treatment between (1) ton/dun of organic fertilizer, poultry waste, and the Iranian variety achieved the highest seed yield, amounting to (0.02695). It differed significantly with both the interaction treatments (0) tons/acre of organic fertilizer, poultry waste, with the Iranian variety, and amounted to (0.021667),

Table (5) effect of organic fertilizer, yeast, varieties, and the interaction between them on the number of seeds per plant during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	70.80 a	75.45 a	73.13 b
	5	66.17. a	79.64 a	72.91 b
	10	66.42 a	77.27 a	71.84 b
1.5	0	81.25. a	92.58 a	86.91 a
	5	77.16 a	92.69 a	84.93 a
	10	79.53 a	82.78 a	81.16 b
2	0	76.99 a	85.05 a	81.02 ab
	5	79.87 a	90.88 a	85.38 a
	10	85.47 a	98.00 a	91.73 a
Organic x variety		Iranian	Argentina	Organic fertilizer
0		67.796 b	77.45489 b	72.625 b
1.5		79.313 b	89.351 a	84.332 a
2		80.775 ab	91.312 a	86.043 a
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		76.343 a	84.362 a	80.353 a
5		74.401 a	87.739 a	81.070 a
10		77.139 a	84.016 a	51.578 b
variety		75.961 b	86.039 a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

and also with the interaction treatment (2) tons/acre, organic fertilizer, poultry waste, with the Argentine variety, which amounted to (0.023167). The highest seed yield for each plant came from the effect of the interaction treatment between (5) g/L dry baking yeast with the Iranian variety and amounted to (0.0265) and differed significantly with some of the dual interaction treatments. The lowest seed yield came as a result of the double interaction between (5) g/L dry baking yeast with the Argentine variety, which amounted to (0.0214). As for the effect of the triple interaction between the studied factors (organic fertilizer, poultry waste + dry baking yeast + varieties), the treatment The triple interaction between (2) tons/dunum of organic fertilizer and poultry waste with (0) g/liter dry baking yeast and the Iranian variety achieved the highest seed yield, which amounted to (1.01853), and it differed significantly with some triple interaction coefficients between the three factors and the lowest yield. For seeds for each plant, it was the result of a triple interaction between (0) tons/acre of organic fertilizer, poultry waste, (5) gm/liter, dry baking yeast, and the Iranian variety, and it reached (0.01993).

Based on the data at Table (6), it is clear that the three study factors do not have any significant effect on the characteristics of seed yield per plant. However, there are significant effects of the effect of the bilateral interaction between the levels of organic fertilizer, poultry waste, and the

concentrations of spraying with dry baking yeast on the seed yield of each plant, as the interaction treatment between 1 ton of organic fertilizer, poultry waste, and 0 grams per liter of dry baking yeast achieved the highest seed yield per plant. It amounted to 28.217 grams and differed significantly with some of the double-interaction treatments. The lowest result of this was 20.383 grams per plant, which came as a result of the effect of the double-interaction between 0 tons/acre of poultry waste fertilizer with a spray concentration of 5 grams per liter of dry yeast. The double-interaction treatment also achieved Between the Iranian bean variety and 1 ton/dunum of poultry waste fertilizer, the highest seed yield per plant amounted to 26.956 grams, while the lowest yield came from an interaction between the Iranian variety and 0 tons per dunum of organic fertilizer and poultry waste, amounting to 21.667 grams. It is also shown from the same table that the interaction between 0 grams per liter of dry baking yeast with the Argentine variety increased the seed yield of the plant and amounted to 26.022 grams, and it varied significantly with some binary interaction coefficients.

The triple interaction treatment between the three factors also achieved significant effects on the seed yield characteristic of each plant. The triple interaction treatment achieved between 0 tons per dunum of poultry waste fertilizer with 10 grams per liter of dry baking yeast with the Argentine variety, and the triple interaction treatment between 2 tons per A dunum of organic fertilizer, poultry waste, with 5 grams per liter of dry baking yeast, with the Iranian variety, the highest seed yield for a plant reached 31,767. It differed significantly with some of the triple interaction treatments, and the lowest result resulted from the effect of the triple interaction between 2 tons per dunum of organic fertilizer and poultry waste with spraying at a concentration of 0 grams per liter of dry baking yeast with the Iranian variety. The lowest seed yield of the plant amounted to 18.533.

Table (7) indicate that the three factors individually do not have any significant effect on the seed yield of the plant. As for the effect of the bilateral interaction between 0 tons per dunum of poultry waste fertilizer and 5 grams per liter of dry yeast, the highest seed yield per plant was achieved, amounting to 4.574 tons per hectare.

Table (6) effect of organic fertilizer, yeast, varieties, and their interaction on the characteristic of seed yield/plant (g) during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	23.900 bc	25.467bc	24.683bc
	5	19.933f	20.833bc	20.383c
	10	21.167bc	31.767a	26.467a
1.5	0	26.667ab	29.767a	28.217a
	5	27.800ab	22.900b	25.350a
	10	26.400ab	21.500bc	23.950bc
2	0	18.533f	25.133bc	21.833c
	5	31.767a	20.467de	26.117a
	10	23.500b	23.900de	23.700b
Organic x variety		Iranian	Argentina	Organic fertilizer
0		21.667c	26.022a	23.844a
1.5		26.956a	24.722a	25.839a
2		24.600a	23.167b	23.883
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		23.033c	26.789a	24.911a
5		26.500a	21.400c	23.950a
10		23.689c	25.722b	24.706
Variety		24.407a	24.637a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

The lowest yield, which was 3.347 tons per hectare, came as a result of the bilateral interaction between 0 tons per dunum. Of poultry waste fertilizer, sprayed at a concentration of 5 grams per litre. It appears from the same table that the bilateral interaction treatment between 1 ton/acre of poultry waste fertilizer with the Iranian variety had the highest yield of 4.679 tons per hectare, and the lowest yield came from the interaction effect between 0 tons per dunum of poultry waste fertilizer with the same variety. There was a significant effect of the double interaction treatment between 0 grams per liter of dry baking yeast and the Argentine variety, with the highest yield reaching 4.655 tons per hectare. It is noted from Table (7) that the highest total yield per unit area came from the triple interaction between 2 tons of organic fertilizer, poultry waste, 5 grams per liter of dry baking yeast, and the Iranian variety. The highest yield reached 5.535 tons per hectare, and this treatment was significantly superior to some interaction treatments. The triple interaction between the study factors and the lowest seed yield per unit area came from the effect of the triple interaction between the three factors: 0 tons per acre of poultry waste fertilizer with 5 grams per liter of dry baking yeast with the Iranian variety, amounting to 3.056 tons per hectare.

Table (7) effect of organic fertilizer, yeast, varieties, and the interaction between them on the characteristic of seed yield per unit area (ton/acre) during growing season, spring 2023*

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentina	
0	0	4.786ab	4.402a	4.594a
	5	3.086c	3.607b	3.347b
	10	3.682bc	5.466a	4.574a
1.5	0	4.575b	5.186a	4.880a
	5	4.844a	3.952bc	4.398a
	10	4.617ab	3.745bc	4.181a
2	0	3.229c	4.379ab	3.804b
	5	5.535a	3.565bc	4.55a
	10	4.069a	3.983bc	4.026a
Organic x variety		Iranian	Argentina	Organic fertilizer
0		3.851b	4.491a	4.171a
1.5		4.679a	4.294a	4.487a
2		4.278a	3.976b	4.127a
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		4.197b	4.655a	4.426a
5		4.488a	3.708b	4.098a
10		4.123b	4.398a	4.260a
variety		4.269a	4.254a	

*The coefficients that contain the same letters of the alphabet do not differ significantly from each other according to the Duncan test at a probability level > 5%.

Through tables (1, 2, 3, 4, 5, 6, 7), which are represented by the characteristics of the number of seeds per pod, the weight of 100 seeds, the length and diameter of the seed, the number of seeds per plant, the seed yield per plant in grams, and the total seed yield in tons/ha. The levels of organic fertilizer (poultry waste) had a significant effect on the characteristics of the number of seeds per plant and the length of the seed diameter, and the concentrations of spraying dry baking yeast had significant effects on these characteristics, while the two varieties differed among themselves in their effect on these characteristics. It also appears from the tables above that there are direct significant effects of the bilateral interaction between the organic fertilizer and poultry waste with the concentrations of yeast used, as well as the bilateral interactions between the organic fertilizer

and the poultry waste with the two varieties, and the bilateral interaction between the concentrations of yeast used and the bean varieties on these characteristics. There were also differences Clear significance for the effect of the triple interaction between the study factors. This result is explained by the mineral elements that the organic fertilizer contains, which are necessary for plant growth during the vegetative growth stage, represented by the number of side branches of each plant, the total chlorophyll content, and the leaf area (tables), which consider these characteristics as a food source or factory, the formation of carbohydrates, proteins, and starchy substances, and the storage of elements in the cells. The poultry waste fertilizer had an effect on improving the properties and texture of the soil. It also helped the penetration of plant roots and increased their exchange capacity. It also worked on the activity of microorganisms in the soil and also worked to increase the soil's water retention.

The root area was always moist and cool, which activates element absorption processes. nutrients available to the plant (Cook 1972; Lai and Mathur 1989; Afzel and Adams 1992; and Al-Naimi, 1999). Organic fertilizers are natural materials and a good reaction medium for microorganisms that have a direct role in plant nutrition and improving vegetative and fruiting qualities (Abd-Elmohsen, 2003). This result is consistent with (Singh and Chauhan 2009; Rady *et al*. 2016; Fouda *et al*. 2017; Elka and Laekemeriam 2020; and Ahmad and Arain 2021), who indicated through their research that the levels of organic fertilizer and poultry waste had significant effects. Positive effect on the bean plant, as it caused significant differences in the characteristics of the number of seeds per plant, the weight of 100 seeds, the length and diameter of the seed, in addition to the number of seeds per pod. The concentrations of yeast used also had positive effects on these traits. These results are explained by the role of yeast in fortifying the vegetative growth traits and the qualitative traits of dry pods, because dry yeast contains the nutrients necessary for the growth and maturation of pods and contains many germ cells that play a major role in the establishment and maturation of pods in addition to improving the characteristics of vegetative growth represented by the number of side branches, leaf area, and total chlorophyll content. In cells yeast is also a natural source of plant regulators and hormones such as auxins and cytokinins (Amer 2004) and works to accumulate carbohydrates in plant cells (Barentt *et al*., 1990).

It works to activate, stimulate, cell division and elongation, and protein and DNA synthesis (EL-Desouky *et al.*, 1998 and Wanas 2002). These results were consistent with (Rania *et al*. 2011; Nassar *et al*. 2011; Abo-EL-Yazied and Mady 2012; Muhammad *et al*. 2020; and Huthily *et al*. 2020) that yeast concentrations on bean plants had effects Positive significance for the characteristics of the number of seeds per plant, the weight of 100 seeds, and for the characteristics of seed quality and seed yield. There were significant differences in the effect of the varieties on the quality characteristics of seeds and yield in beans. This may be due to variations in the influence of genetic factors carried by each variety, in addition to the variation in the extent of the varieties' response to the prevailing environmental conditions in the study area from seed planting to pod maturity and also the interaction.

The influence between the varieties carrying the genetic and environmental factors combined has a major impact on these traits, as well as the variation of the varieties in vegetative growth and pod traits which play a major role in seed quality and yield. These results were consistent with (Chandhia 2001 for seed quality; Elballa *et al*. 2004 for weight 100 seeds; Sicard *et al*. 2005 for seed weight and number of seeds per plant; Harmankaya *et al*. 2008 for number of seeds per pod and weight of 100 seeds; and Iqbal *et al*. 2010, for number of seeds per pod and weight of 100 seeds;Palmero *et al*. for weight of 100 seeds; Lima *et al*. 2012 for weight of 100 seeds, Kazemi *et al*. 2012 for trait for 1000 seeds and seed yield per plant and per unit area; Mulugeta *et al*. 2013 for number of seeds per unit area. and weight of 100 seeds, and Joseph *et al*. 2014 to describe the number of seeds per pod; Bagheri *et al*. 2017 to describe the number of seeds per pod and weight of 100 seeds; Esho 2019 to describe the number of seeds per pod and weight of 100 seeds and seed yield per plant, and Al-Tae 2019 to describe length and diameter. The seed and the weight of 100

seeds, and Jasim and Esho 2020 to describe the number of seeds per pod, the length and diameter of the seed, and the weight of 100 seeds outcomes.

CONCLUSION

Through the results obtained from this study, we conclude that the varieties was significantly different in some seed traits , the organic fertilizer (poultry manure and concentration of dry yeast and varieties weight of 100 seeds , number of seed per pod and seed yield.

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REFERENCES

Abdel-Hakim ,W.M.; Y.W.M.M. Moustafa and R.H.M. Gheeth (2012). Foliar Application of Some Chemical Treatments and PlantingDate Affecting Snap Bean (*Phaseolus vulgaris* L.) Plants Grown in Egypt.Journal of Horticultural Science Ornamental Plants 4 (3): 307-317, DOI: 10.5829/idosi.jhsop.2012.4.3.260

Ahmad Yar Ahmadi , A. Y. and M. J. Arain (2021). The Response of Common Bean (*Phaseolus vulgaris* L.) to Different Levels of Organic and Inorganic Fertilizers. International Journal of Life Sciences and Biotechnology, 4(3): p. 439-450. DOI: 10.38001/ ijlsb.981373

Akcin, A. (1988). Yemeklik Dane Baklagiller Selçuk Üniversitesi, Ziraat Fak. Yayın 8, Konya.

AL-Amery ,N and M. M. Mohammed (2017). Influence of adding ascorbic acid and yeast on growth and yieldand Rhizobium of snap bean (*Phaseolus vulgaris* L.) underirrigation with saline water. *IOSR Journal of Agriculture and Ve terinary Science,10(10)* ,23-28

Al-Rawi, Kh. M. and Abdul. M. Khalaf Allah (2000). Design and analysis of agricultural experiments, University of Mosul, Ministry of Higher Education and Scientific Research, Dar Al-Kutub for Printing and Publishing, Republic of Iraq.

Al-Taie, Sarah Raed Mahmoud (2022). Response of growth and dry seed yield of two bean varieties to spraying with boron and phosphate fertilization (*Phaseolus vulgaris* L.). Master's thesis, College of Agriculture and Forestry, University of Mosul

Amer, S.S.A. (2004). Growth, green pods yield and seeds yield of common bean (*Phaseolus vulgaris* L) as affected by active dry yeast, salicylic acid and their interaction. J. Agric. Sci. Mansoura. Univ. 29 (3): 1407- 1422.

Amer, S.S.A. (2004). Growth, green pods yield and seeds yield of common bean (*Phaseolus vulgaris* L) as affected by active dry yeast, salicylic acid and their interaction. J. Agric. Sci. Mansoura. Univ. 29 (3): 1407- 1422.

Arunga ,E.E.Van Rheenen ,H.A.,&Owuoche ,J .O.(2010) .Diallel analysis of Snap bean (*Phaseolus vulgaris L.*) varieties for important traits .African Journal of Agricultural Research .5(15) ,PP:1951-1957.

Bagheri, M ., Kahrizi, D., and Zebarjadi, A. (2017). Study on genetic variation and morpho - phenolgic traits in common bean (*Phaseolus vulgaris* L.) .Biharean Biologist , Oradea Romania , 11 (1) : 43-47

Boateng, S.A.; J. Zickermann and M. Kornahrens (2006). Poultry manure effect on growth and yield of maize. West African Journal of Applied Ecology, 9 (1). DOI: 10.4314/wajae.v9i1.45682.

Brusamarello ,A.P.,Oliveira ,P.H.,Sebim .D.E.,&Baretta,D.R.(2017) .Perfomans of bean (*Phaseolus vulgaris L.*) genotypes in the second –season under high and low technology management in the parana ,Brazil .plant Breeding and plant Genetic Resources .Acta Agron .66(3) p436-441.

Cook , G .W .(1972) .Fertilizer for maximum yield .Richard clay (The Chaucer press) LTD . Bungay .Suffolk ., Great Britain ,457.

El-Desouky, S.A., A.L. Wans and Z.M. Khedr (1998). Utlization of some natural plant extracts (of garlic and yeast) as seed – soaked materials to squash (Cucurbatia pepo L). I- Effect on growth, sex expression and fruit yield and quality. J. Agric. Sci. Moshtohor, Zagazig. Univ., 35(2): 839-854.

Elka, E. and F. Laeke Mariam (2020). Effects of Organic Nutrient Sources and NPS Fertilizer on the Agronomic and Economic Performance of Haricot Bean (*Phaseolus vulgaris* L.) in Southern Ethiopia .Research. Article | Article ID 8853552 | https://doi.org/10.1155/2020/8853552.

Esho, K. B. (2019). Study the genetic parameters in Phaseolus . International Journal of Advances in Science Engineering and Technology , 7(1) : 25-30

E-Tohamy , W . A . and .N.H.M.EL-Greadly.(2007). Physiological Responses, Growth, Yield and Quality of Snap Beans in Response to Foliar Application of Yeast, Vitamin E and Zinc under Sandy Soil Conditions. Australian Journal of Basic and Applied Sciences, 1(3): 294-299

Fageria ,N.K.,Baligar ,V .C.,&Jones ,C.A.(2011) .Mineral nutrition of field crops .In Growth and ,3 rd ,Boca Raton ,F1.:CRCPress.

Fouda ,K.F.;A.M.EL-Ghamry ;Z.M.EL-Soirfy and I.H.A.Klwet (2017). Integrated Effect of Fertilizers on Beans Cultivated in Alluvial Soil. Egypt. J. Soil Sci., Vol. 57, No.3, pp. 303 – 312 . DOI : 10.21608/EJSS.2017.4384.

Harmankaya, M., önder, M., Hamurcu, M., Ceyhan, E., and Gezgin, S. (2008). Response of common bean (*Phaseolus vulgaris* L.) cultivars to foliar and soil applied boron in boron- deficient calcareous soils. African Journal of Biotechnology Vol. 7 (18), pp. 3275-3282.

Iqbal, A.M., Nehvi, F.A., Wani, S.A., Qadri, H., Dar, Z.A. and Lone, A.A. (2010). Combining ability studies over environments in Rajmash(*Phaseolus vulgaris* L.) in Jammu and Kashmir, India. Journal of Plant Breeding and Crop Science, 2(11): 333-338.

Jasim, E.A.A. and Esho, K.B. (2020). Correlation and path coefficient analysis in some varieties of phaseolus (*Phaseolus vulgaris* L.). International Journal of Science and Research (IJSR): 9 (8):984-952. DOI: 10.21275/SR20812140529

Kamfwa ,K., Cichy ,K.A.,& Kelly,J .D. (2015) Genome-wide association study of agronomic traiys in common bean .The plant Genome . 8,NO .2.

Lima ,M.S.de.,de .Souza ,J.E.,Carneiro ,P.C.S.,Pereira ,C.S.,Vieira ,R.F., & Cecon ,P.R.(2012) .Characterization of genetic variability among common bean genotypes by morphological descriptors .Crop Breeding and Applied Biotechnology 12:76-84

Mahmoud, S.O and D.A.M. Gad (2020). Effect of vermicompost as fertilizer on growth, yield and quality of bean plants (*Phaseolus vulgaris* L.). Middle East Journal of Agriculture Research 9 (1) 220-226 DOI: 10.36632/ mejar / 2020.9.1.19.

Mahmoued, T.R., 2001. Botanical studies on the growth and germination of mahnolia (*Magnolia grandiflora* L.) plants. M. Sci. Thesis. Fac. of Agric. Moshtohor, Zagazig Univ. Egypt.

Marhoon ,I.A; W .Y. Lahmood and S. Saleh (2018) . Effect of nanocarbon and yeast suspension on some vegetative growth and yield characters of *Vinga unguiculatal* under salt water stress. EurAsian Journal of BioSciences ,12,9-12

Mulugeta ,A.T.,Hussein ,M.A.,& Habtamu ,Z .(2013) .Inheriatance of primary yield component traits of common bean (*Phaseolus vulgaris L.*) : number of seeds per pod and 1000 seed weight in an 8*8 diallel cross population .International Scholarly and Scientific Research & Innovation 7(1).

Nassar, R. M. A., Y. M. Ahmed and D. M. A. Nassar (2011). Effect of foliar spray with active yeast extract on morphological, anatomical and yield characteristics of kidney bean (*Phaseolus vulgaris* L.). Australian J. Basic and Appl. Sci., 5(5): 1071-1079.

Palmero, D.; Iglesias, C.; de Cara M.; Tello J.C. and Camacho F. (2011). Diversity and health traits of local landraces of runner bean (*Phaseolus coccincus* L.) from Spain. Journal of Food, Agriculture and Environment, 9 (1): 290-295. 2011

Rady .M.M.; W . M . Semida ; KH. A . Hemida and M .T. Abdelhamid(2016) .The effect of compost on growth and yield of(*Phaseolus vulgaris* L.) plants grown under saline soil. International Journal of Recycling of Organic Waste in Agriculture 5: 311–321.

Ramadan, M.M. A.(2020). Effect of algae and yeast extracts as foliar application on the production on the snap bean growth under sandy soil conditions . Menoufia J. Plant Prod., Vol. 5 February 37–53.

Sachan, H.K. and D. Krishna (2021). Effect of Organic and Inorganic Fertilization on Growth and Yield of French Bean (*Phaseolus vulgaris* L.) in Fiji . Legume Research- An International Journal, Volume 44 Issue 11: 1358-1361

Santos ,G . M., A .P. Oliveira ,J .A.L.Saliva ,E . I. Alves and C .C.COSTA .(2001) .Characteristics and yield of snap bean pods in relation to sources and levels of organic matter . Hort . Brasileira ,19 (1) : 30-35 .

Sardana ,V.;K.K.Dahingra ;M .S. Gill and I .J.Singh (2000) . Produetion technology of French bean *(Phaseolus vulgaris L.*) cultivation :areview .Agric ,Rev .,21(3)p:141-154.

Sible – I; F.Basdemir ; Seval Elis and B.T. Bicer (2022). The Effect of in organic nitrogen and Phosphorus Fertilizers, Chicken manure and Their Combinations on growth and development of common bean (*Phaseolus vulgaris* L.). MAS JAPS ;7 (4) : 880–890. DOI :http://dx.doi.org/10.5281/zenodo.7231875 .

Sicard ,D.,Nanni ,L.,Porfiri ,O ., Bulfon ,D., & Papa ,R.(2005) .Genetic diversity of (*Phaseolus vulgaris L.*) and P .coccineus L .Iandraces in central Italy .Plant Breeding 124 ,464-472 2805 Blackwell Verlag ,Berlin

Wanas, A. (2006). Trails for improving growth and productivity of tomato plants grown in winter. Annals of Agricultural Science Moshtohor, 44(3): 466-471

Wanas, A.L., 2002. Resonance of faba bean (*Vicia faba* L.) plants to seed soaking application with natural yeast and carrot extracts. Annals. Agric. Sci. Moshtohor, 40(1): 259-278.

Yoseph ,T.; Gashwa,G ., Shiferaw , W ., Simon ,T., & Mekonnen ,E.(2014) . Evaluation of common bean (*Phaseolus vulgaris L.*) varieties , for yield and yiled components .Journal of Biology . Agric .and Healtheare ,4(17) :22-26.