The Role of Organic Fertilizer (Poultry Manure) and Spraying with Dry Baking Yeast on the Vegetative and Flowering Growth Characteristics of Two Types of Beans

Alyaa Hussain Ali, Esraa Abd-Alhuseein Jasim

Department of horticulture and landscape design, college of agriculture and forestry, Mosul university
Email: aalyaa.22agp79@student.uomosul.edu.iq

The study was carried out in the vegetable research experiment field of the Department of Horticulture and Landscape design/College of Agriculture and Forestry/Mosul University /Tourist Forests, during the spring growing season of 2023, to study the role of organic fertilizer (poultry manure) and spraying with dry yeast on the vegetative and flowering growth characteristics of two varieties of beans. The study included three factors: first was organic fertilizer (poultry manure at levels (0, 1, and 2) tons/acre, second factor is the extract dry yeast at concentrations (0, 5, 10 g/l), and third factor was two types of imported beans (Snap bean), namely (Iranian and Argentinean). The results show that the two varieties differed significantly among themselves in plant height, the number of lateal branches, percentage of dry matter in vegetative growth, percentage total chlorophyll, date of flower appearance, and the number of flowers per plant, while the level of 2 tons/donum of poultry waste fertilizer had the highest significant values in the characteristics. The number of side branches per plant and the total chlorophyll content. Spraying with a concentration of 5 g/L of dry baking yeast achieved the highest values in the flowers of 50% of the plants. The binary interaction coefficients between the organic fertilizer, poultry waste, and dry baking yeast also excelled. Significant effects on some characteristics of vegetative growth.

Keywords: Phaseolus, dry yeast, poultry manure, biofertilzer, vegetative growth.

1. Introduction

Phaseolus, is one of the plants of the Fabaceae family. scientific name is (Phaseolus vulgaris L.), South America is its original homeland (Hassan et al., 2003). The plant is grown in Iraq at two growing season ,the first date during the spring season for period from March, the plant completes its life cycle until the end of June, the second date is planted in the fall during

August or the beginning of the month of September. The bean crop is consumed either in the form of green, physiologically immature pods, or in the physiological stage maturity, when seeds are fully mature, dry seeds contain percentages of protein (13 to 20%) depending on the variety (Fageria et al., 2011, and Al-Taie, 2022). The growth of bean plants is affected by many agricultural factors, including varieties, nutrients, and organic, bio-fertilizers, in addition to the use of fertilization techniques with biological fertilizers, including yeast because of the nutrients it contains in addition to plant hormones. Varieties or genotypes of beans vary in the traits of vegetative and flowering growth and the characteristics of pods, For the purpose of increasing productivity and improving its quality, there are several practices that must be used in bean production fields, including cultivating good, highly productive varieties adapted to the Iraqi environmental conditions, in addition to integrated organic and biological fertilizers. All of these practices lead to increase in organic matter (OM) in the soil, which improves the soil structure and increases the ability of the soil to retain water and improve the role of nutrients during the stages of plant growth from seed planting to maturity (Saha, 2008). Organic fertilizers of various types constitute an important source of organic matter added to the soil. It has been found that the use of organic fertilizers improves vegetative growth in many crops of the leguminous family, including beans (Gabr 2000). Santosa et al. (2017) through their study on the use of 5 and 10 tons/ha of organic fertilizers from cow manure on bean plants achieved the best results in main stem length and total leaf area. Eberechi occurred(2018) 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 characteristics of both the biological yield of the plant and the weight of the leaves. Sachan and Krishna (2021) found that when they used organic and inorganic fertilizer the organic fertilizer caused significant increases in growth characteristics , plant height, the number of side branches per plant, and leaf area per plant. Ahmad and Arain (2021) in Afghanistan indicated through their study , the response of the local variety of bean plant, when using organic fertilizer (poultry manure) at levels (0, 5 and 10 tons/ha) that the organic fertilizer had a significant effect on the characteristics of vegetative growth when Using a concentration (10 tons/ha) represented by the number of lateral branches per plant and the number of leaves per plant, while the second concentration (5 tons/ha) gave significant increases in plant height. Sibel et al., (2022) found in Turkey when used organic fertilization with poultry waste and inorganic fertilization for the growth and yield of bean variety (Aras 98) used poultry waste (2000 kg/ha) and (2000 kg poultry + 40 kg nitrogen + 80 kg phosphorus/ha). (3000 kg of poultry + 40 kg of nitrogen + 80 kg of phosphorus/ha) showed significant increases in vegetative growth traits represented plant height and lateral branchs /plant . AL-Kahal et al ., (2002) observed, through their study, the effective role of yeast when added to the soil in improving the root nodulation, growth and yield of two varieties of beans Giza6 (local variety) and Nadrasca (improved variety). the results indicated that there was a significant increase in the wet weight. While EL-Tohamy and EL-Greadly (2007) in Egypt through their study of the physiological response , growth and quality of beans of the bronco variety through spraying with yeast, , where (5 and 10 g) of yeast caused significant increases in plant height and plant wet weight. Abdel-Hakim et al., (2012) obtained in Egypt through their study of spraying bean plant, Poulista variety, with yeast at concentrations (4, 8, 12 g/l). The concentration (12 g/L) of yeast significantly increases plant height and the number of side branches per plant. AL-Amery and Mohammed (2017) in Iraq, when using yeast on the growth

of bean plants at concentrations (0.3 g/L of ascorbic acid with 12 g/L of yeast), showed significant increases in traits of vegetative growth represented by plant height and area. Ramadan (2020) obtained in Egypt when spraying bean plants at a rate of (10 g/L) that caused significant increases in both plant height, the number of branches per plant, and the dry weight of vegetative growth, in addition to an increase in the total chlorophyll in the leaf tissue. There are many varieties of beans spread in the world, some used for human consumption as immature pods, and the other portion used for dry consumption or dry seeds. these varieties differ among themselves in the vegetative traits, floral, fruitful, and seed growth (Hassan 2002). Santalla et al. (2002) studied the performance bean genotypes and showed significant differences in the characteristics of vegetative growth represented by plant height and wet weight of vegetative growth. The results of Elballa et al. (2004) in Sudan to evaluate the performance of two green bean varieties, Narino and Maestro, indicated that the Narino variety was significantly superior in plant height. Abdel-Mawgoud et al. (2005) when study the performance of four bean varieties: Royal Nel, Duel, Coby and Juliafor vegetative growth, Royal Nel variety was significantly superior in plant height , while Coby variety, in the number of leaves and branches/plant over the rest of the varieties. Rodino et al., (2007) obtained, through their study of (30) genetic makeup of beans, they showed significant differences in the height in the wet and dry weight of the vegetative growths. 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 characteristics of plant height and the number of side branches for each plant. Iqbal et al., (2010) indicated that bean varieties differed among each other in plant height and the number of side branches for each plant. Tryphone and Msolla (2010) in Tanzania obtained from their study of (90) varieties of beans that these varieties differed among themselves in the characteristics of the number of days to flower by 50%, and the flowers had the shortest number of days to flower, 26-67 days. Arunga et al., (2010) in Kenya, when evaluation (25) bean genotypes, indicated that these genotypes varied among themselves in both the number of days to flowering and the height of the plant at the flowering stage. Palmero et al. (2011) found differed significantly among (17) genotypes of phaseolus in plant height and the number of side branches for each plant. Lima et al., (2012) in Brazil observed, in their study of the genetic variations of (100) genotypes in beans, that the varieties (Gold Gate, V7936 and CNF 9454, PF 9029975) produced the highest values in the number of days. From planting to flowering. Bagheri et al., (2017) in their studied the evaluation and performance of (9) bean genotypes, they noted that the genotypes differed in plant height and the number of side branches for each plant. Brusamarello et al., (2017) in Brazil, when they studied (13) genotypes of beans, indicated that the genotypes differed among themselves in the characteristics of plant height, the number of side branches for each plant, and in the percentage of dry matter in vegetative growth. Alemu et al., (2017) in Ethiopia, in their study to evaluate (36) genetic combinations of beans, found there are significant differences between these combinations with respect to plant height, in the number of days for 50% of the plants to flower, and in the leaf area of each plant. Esho (2019) obtained, through his study of (12) genetic makeup of beans, that they differed significantly among themselves in the characteristics of plant height, the number of side branches for each plant, and the total leaf 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 plant height and the number of side branches for each plant.

This research aims to study role of organic fertilizer (poultry waste) and spraying dry baking yeast on the vegetative and flowering growth characteristics of two types of beans.

2. Materials and methods

Study was carried out at the vegetable research experiment field of the Department of Horticulture and Landscape design/College of Agriculture and Forestry/University of Mosul/Tourist Forests, during the spring growing season of 2023, to study the role of organic fertilizer (poultry waste) and spraying with dry yeast on the vegetative and flowering growth characteristics of two varieties of beans. The seeds were planted directly in the field on 3/19/2023. After completing the seed planting, watering was done. The field is lightly irrigated. All agricultural operations were carried out to serve the crop, including irrigation, where irrigation was carried out, allowing water to reach the upper third of the farms, and manual weeding on all experimental units equally and according to the recommendations followed in growing beans (Hassan 2002). The study included three factors: the first factor: organic fertilizer (poultry manure at three levels (0, 1, and 2) tons/donum, second factor is the extract dry bread yeast at concentrations (0, 5, 10 g/l), and third factor was two types of beans (Snap bean), namely (Iranian and Argentinean). The study was combined with a completely randomized block design factorial with a split-split plot system, with three replications for each experimental unit. Thus, the organic fertilizer (poultry manure as main plot , yeast in sub blot and varieties in sub- sub plot. All experimental units were fertilized uniformly with chemical fertilizer, adding 80 kg/dunum of triple superphosphate fertilizer, 75 kg of urea fertilizer per dunum, and 50 kg of potassium per dunum (Matlob et al., 1989). Organic fertilizer and poultry waste were added a week before planting, while dry yeast was added in three times , the first after the appearance of the second true leaf, the second spray 20 days after the first spray, and the third spray 20 days after the third spray. The measurements were taken on the following characteristics: plant length (cm), the number of side branches for each plant, the percentage of dry matter in vegetative growth (g), and the total chlorophyll in the leaves using the acetone method , according to the Mackinney (1941) and Arnon (1949) and the date of emergence of flower buds, the date of flowering of 50% of the plants in one experimental unit, and the number of flowers for each plant. Data were analyzed using the program (SAS, 1999) and the means were compared at the 5% probability level for Duncan's multinomial test (Al-Rawi and Khalaf Allah, 2000).

3. Results and discussion

It appears from Table (1) that both the organic fertilizer, poultry waste, and dry yeast, and the two-way interaction between the organic fertilizer, poultry manure, and dry yeast, , and the three- interaction between the three factors did not reach the level of significance on the plant height characteristic, as appears. From the table, there are significant differences in the effect of varieties on this trait, as the Iranian variety outperformed the Argentine variety, reaching (50.111) and (45.384) cm, respectively. It also appears from Table (2) that the organic fertilizer and poultry waste had a significant effect on the number of side branches per plant, as level (1) significantly exceeded the comparison treatment without fertilization and reached (4,832

and 4,389) branches per plant, respectively. It also appears from the same table that dry yeast does not significant effect on this characteristic. As for the varieties, the Argentinian variety was significantly superior to the Iranian variety in this trait, and the number of branches reached (4,889 and 4,308) branches per plant, respectively. As for the effect of the interaction between the organic fertilizer, poultry waste, and yeast, their overlapping effect was significant on this trait, as the interaction treatment between the organic fertilizer exceeded (1) ton/dunum of poultry waste with (5) gm/liter yeast, as it achieved the highest value in the number of side branches and reached (5,387) branches per plant and the smallest number of side branches resulted from the effect of the interaction between (2) tons/dunum of organic fertilizer and poultry waste with (10) g/liter of dry yeast, which amounted to (4,278) branches/plant. As shown in the same table shows that the interaction between organic fertilizer, poultry waste, and varieties, and dry yeast, with varieties, did not reach the level of significance in terms of its effect on the number of lateral branches of each plant. As for the effect of the triple interaction between the three factors (organic fertilizer, poultry waste, dry baking yeast, and varieties),

Table (1) The effect of organic fertilizer, poultry waste, dry baking yeast, and varieties on bean plant height during growing season, spring 2023*.

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	44.67 a	46.22 a	45.445 b
	5	54.33 a	56.67 a	55.50 a
	10	47.56 a	39.89 a	43.722 b
1.5	0	49.33 a	37.22 a	43.278 b
	5	49.78 a	43.034 a	46.557 b
	10	49.89 a	47.78 a	48.833 a
2	0	53.11 a	50.11 a	51.613 a
	5	45.11 a	40.67 a	42.890 c
	10	57.22 a	46.56 a	51.890 a
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		48.852 a	47.592 a	48.222 a
1.5		49.666 a	42.78 a	46.223 a
2		51.816 a	45.78 a	48.798 a
Dry yeast x variety		Iranian	Argentina	Dry yeast
0		49.038 a	44.520 a	46.779 a
5		49.740 a	46.891 a	48.316 a
10		51.556 a	44.741 a	48.148 a
Variety		50.111 a	45.384 b	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

it significantly affected this characteristic for the Duncan multinomial test at the probability level (5%), as the triple interaction treatment between the organic fertilizer and poultry waste achieved (1) ton/dunum with (5) g/l. of dry yeast and the Argentinean variety. The highest number of side branches per plant reached (5.887), while the lowest number resulted from the

triple intervention treatment between (0) tons/dunum of organic fertilizer and poultry waste with (10).) gm/liter of dry yeast, the second type, amounted to (3.89) branche/plant. It appears from Table (3) that the levels of organic fertilizer and poultry waste had a significant impact on dry matter percentage, as (1) ton/dunum of organic fertilizer and poultry waste achieved the highest percentage content of dry matter in vegetative growth, amounting to (16.654), and it was significantly superior to both levels (0 and 2), while there was no significant effect of dry yeast concentrations on this trait at the probability level (5%) for Duncan's multinomial test. It also appears from the same table that the Argentinean variety was significantly superior to the Iranian variety in this characteristic, the percentage reaching (15.881 and 14.602), respectively. As for the effect of the interaction between organic fertilizer, poultry waste, and different concentrations of dry yeast, it does not have any clear significant effect on this trait. The effect of interaction between both organic fertilizer with varieties and dry b yeast with the varieties on this characteristic did not reach the level of significance, as for the effect of interaction between the three factors under study, there appeared to be a clear significant effect on the percentage of dry matter, as the interaction treatment achieved (1) ton/dunum of organic fertilizer, poultry waste, with (5) gm/liter of dry yeast with the Argentinean variety, the highest. The percentage of dry matter in vegetative growth reached (23.992), and the lowest percentage of dry matter came as a result of the interaction between the three factors (2) tons/dunum of organic fertilizer(poultry manure) with (0) g/liter of dry yeast with the second type, which amounted to (12.183).

Table (2) The effect of organic fertilizer, poultry waste, dry baking yeast, and varieties on lateral branches per plant bean during growing season, spring 2023*..

Organic fertilizer (ton.donum)	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	4.1100 b	4.8900 ab	4.500 a
	5	4.3333 ab	4.4467 ab	4.390 bc
	10	3.8900 b	4.6667 ab	4.278 bc
1.5	0	4.0000 b	4.6667 ab	4.333 b c
	5	4.8867 ab	5.8867 a	5.387 a
	10	4.3333 ab	5.2200 ab	4.777 a
2	0	4.6667 ab	5.5567 ab	5.112 a
	5	4.3300 ab	4.3333 ab	4.332 bc
	10	4.2233 ab	4.3333 ab	4.278 c
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		4.1111 a	4.6678 a	4.3894 b
1.5		4.4067 a	5.2578 a	4.8322 a
2		4.4067 a	4.7411 a	4.5739 a
Dry yeast x variety		Iranian	Argentinean	Dry yeast
0		4.2589 a	5.0378 a	4.6483 a
5		4.5167 a	4.8889 a	4.7028 a
10		4.1489 a	4.7400 a	4.4444 a
Variety		4.3081 b	4.8889 a	

*Coefficients that contain the same alphabet are not significantly different from each other

according to Duncan's test at a probability level > 5%.

Table (4) showed that the levels of organic fertilizer (poultry waste) had a clear significant effect on this trait, as the treatment of (0 and 2) tons/acre of organic fertilizer achieved the highest total chlorophyll content, reaching (20.341 and 23.22), respectively, and they were significantly superior compared with the treatment of (1) ton/dunum of organic fertilizer poultry waste on this trait, reached (18.811). There was also no significant effect when using different concentrations of yeast on the total chlorophyll content for the Duncan multinomial test at the probability level (5%) as for the effect of varieties on this trait, the Argentinean variety was significantly superior than Iranian variety in total chlorophyll content, reaching values of (22.146 and 19.435), respectively. As for the effect of the binary interaction between organic fertilizer and poultry waste on different concentrations of dry yeast, the binary interaction treatment between (0) tons/dunum of organic fertilizer and poultry waste with (5) gm/liter achieved the highest significant reading in the total chlorophyll content, reaching (23.263) and differed significantly only with the two treatments.

Table (3) effect of organic fertilizer (poultry waste), dry yeast, and varieties on percentage dry Matter in vegetative growth(%) for bean plant during growing season, spring 2023*.

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	15.917 ab	51.891 ab	15.904 a
	5	13.804 ab	14.675 ab	14.239 a
	10	13.096 ab	15.319 ab	14.207 a
1.5	0	14.688 ab	15.480 ab	15.084 a
	5	14.694 ab	23.992 a	19.343 a
	10	17.848 b	13.224 ab	15.536 a
2	0	12.183 ab	16.332 ab	14.257 a
	5	16.192 ab	12.631 ab	14.411 a
	10	12.995 ab	15.388 ab	14.192 a
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		14.272 a	15.295 a	14.748 a
1.5		15.743 a	17.565 a	16.654 a
2		13.790 a	14.784 a	14.287 b
Dry yeast x variety		Iranian	Argentinean	Dry yeast
0		14.263 a	15.901 a	15.082 a
5		14.896 a	17.099 a	15.998 a
10		14.646 a	14.643 a	14.645 a
Variety		14.602 b	15.881 a	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

The interaction between (0) organic fertilizer and (0) gm/liter yeast with (1) ton/dunum of organic fertilizer and poultry waste with (10) gm/liter, and the total chlorophyll content reached (17.147 and 17.833). respectively . As for the effect of the bilateral interaction between the levels of organic fertilizer, poultry waste, and the varieties, there appeared clear

significant effects of the levels of organic fertilizer, poultry waste, and the species on the total chlorophyll content, as the interaction coefficients were achieved between (0) tons/dunum of organic fertilizer, poultry waste, and (2) tons/dunum. The organic fertilizer with the Argentine variety had the highest reading in the total chlorophyll content, while the lowest reading came as a result of the binary interaction (0) tons/acre. The organic fertilizer and poultry waste with the Iranian variety reached (15.750). There was also a clear significant effect of the effect of the binary interaction between the concentrations of dry yeast. dry with the varieties of this characteristic, and the binary interaction coefficients differed significantly only with the binary interaction treatment (5) g/liter of yeast with the second Iranian variety, which achieved the lowest content of total chlorophyll, reaching (17.452). It appears from the same table that there is a significant effect as a result of the triple interactions between the factors under study, which were the organic fertilizer, poultry waste, dry baking yeast, and the varieties.

Table (4) effect of organic fertilizer(poultry waste) dry baking yeast, and varieties on total chlorophyll during growing season, spring 2023*.

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	14.677 c	19.617 b	17.147 b
	5	15.153 bc	31.373 a	23.263 a
	10	17.420 b	23.803 a	20.612 ab
1.5	0	23.130 a	16.043 b	19.677 a
	5	21.747 ab	16.097 b	18.922 ab
	10	15.147 bc	20.520 b	17.833 b
2	0	26.673 a	25.890 a	26.282 a
	5	15.457 bc	29.523 a	22.490 a
	10	25.333 a	16.447 ab	20.890 a
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		15.750 b	24.931 a	20.341 a
1.5		20.068 ab	17.553 b	18.811 b
2		22.488 a	23.953 a	23.221 a
Dry yeast x variety		Iranian	Argentinean	Dry yeast
0		21.553 a	20.517 a	21.035 a
5		17.452 b	25.664 a	21.558 a
10		19.300 ab	20.257 a	19.778 a
variety		19.435 b	22.146 a	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

It appears from the table that the triple interaction treatment is between (0) tons/acre, organic fertilizer, and (5) gm/ liter of dry yeast and the Argentinean variety achieved the highest significant content of total chlorophyll, amounting to (31.373), and the lowest content of total chlorophyll came as a result of the effect of interaction between (0) tons/dunum of organic fertilizer(poultry waste) and (0) g/liter with the variety. The Iranian reached (14.677).

It appears from Table (5) that the levels of organic fertilizer poultry waste do not have a

significant effect on the number of days (the date of the appearance of flower buds) at the probability level (5%) for the Duncan multinomial test. It appears from the table that when spraying bean plants with a concentration of (10) g/L of dry baking yeast, the date of the appearance of flower buds was significantly earlier, which achieved the least number of days in this trait, amounting to (45,566) days. As for the effect of varieties, the Iranian variety was It was significantly superior to the Argentinean variety in the early date of the emergence of flower buds, as it achieved the lowest number of days for the appearance of these buds, which amounted to (59.63).

Table (5) effect of organic fertilizer, dry yeast, and varieties on date appears of flowers bud during growing season, spring 2023*.

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	46.6667 a	46.3333 a	46.5000 ab
	5	46.6667 a	47.3333 a	47.0000 a
	10	44.6667 a	46.6667 a	45.6667 b
1.5	0	46.6667 a	48.6667 a	47.6667 a
	5	46.3333 ab	48.6667 ab	47.5000 a
	10	45.3333 b	48.6667 a	45.5000 b
2	0	45.3333b c	45.6667 a	46.3333 a
	5	45.6667 bc	47.3333 a	46.6667 a
	10	46.3333 a-c	46.6667 c	45.5000 b
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		46.0000 a	46.7778 a	46.3889 a
1.5		46.1111 a	47.6667 a	46.8889 a
2		45.7778 b	46.2222 a	46.0000 a
Dry yeast x variety		Iranian	Argentinean	Dry yeast
0		46.2222 b	47.4444 a	46.83333 a
5		46.2222 b	47.5556 a	46.8889 a
10		45.4444 c	45.6667 c	45.5556 b
variety		45.9630 b	46.8889 a	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

As the effect of the binary interaction between organic fertilizer, poultry waste, and dry bread yeast concentrations, the binary interaction treatment of (2) tons/dunum of organic fertilizer, poultry waste, with (10) gm/liter of dry baking yeast, achieved the lowest number of days for the appearance of flower buds, amounting to (45,500). (1) day, which was early compared to some of the binary intervention treatments, while the binary intervention treatment was (1) ton/dunum of organic fertilizer poultry manuer with (0) g/liter of dry bread yeast. It delayed the emergence of flower buds, which gave the highest number of days. (47,667) days. As for the effect of the binary interaction between the levels of organic fertilizer and poultry waste (2) tons/acre, overlapping with the Iranian variety, it delayed the emergence of flower buds, which achieved the least number of days, so it reached (45.778) days, and it differed significantly with the rest of the binary interaction treatments, which delayed the emergence

of Flower buds. The double interaction treatment of dry baking yeast (10) g/l also achieved the lowest number of days for the appearance of flower buds for the Argentine and Iranian varieties. While the two-way interaction between (0 and 5) g/L of dry baking yeast interacted with the Argentine and Iranian variety, which delayed the appearance of flower buds. We also find that the triple interaction between the factors under study (organic fertilizer, poultry waste, yeast, and varieties) had a significant effect on the date of emergence of flower buds, as the triple interaction treatment was achieved between (2) tons/dunum of organic fertilizer, and dry yeast at (10) g/l.

Table (6) The effect of organic fertilizer, poultry waste, dry baking yeast, and varieties on 50% of flowering during growing season, spring 2023*.

Organic fertilizer (ton.donum	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	49.3333 b	50.0000 a	49.6667 b
	5	49.6667 b	50.3333 a	50.0000 a
	10	48.6667 b	50.0000 a	49.3333 b
1.5	0	50.3333 a	52.6667 a	51.5000 a
	5	50.3333 a	52.6667 a	51.5000 a
	10	49.0000 b	49.6667 b	49.3333 b
2	0	50.3333 ab	50.3333 a	50.5000 a
	5	49.3333 b	49.6667 b	49.5000 b
	10	50.3333 ab	49.3333 b	49.8333b
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		49.2222 b	50.1111 a	49.6667 b
1.5		49.8889 b	51.6667 a	50.7778 a
2		50.0000 a	49.8889 b	49.9444 b
Dry yeast x variety		Iranian	Argentinean	Dry yeast
0		50.0000 a	51.1111 a	50.5556 a
5		49.7778 b	50.8889 a	50.3333 a
10		49.3333 b	49.6667 b	49.5000 b
variety		49.7037 a	50.6665 a	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

. Dry bread yeast with the Argentine variety had the lowest number of days for the appearance of flower buds, which amounted to (44,667) days, as it was early in doing so, while the triple intervention treatment between (1) ton/acre of organic fertilizer with (0 and 5) gm/liter yeast achieved the highest The number of days on which the flower buds appeared was (48,667) days. This indicates that it delayed the appearance of the flower buds. It appears from Table No. (8) that the levels of organic fertilizer and poultry waste had a significant effect on the flowering date of 50% of the plants, as they were given the treatment (1) ton/dunum of organic fertilizer, poultry waste. The highest number of days for flowering for 50% of the plants reached (50,778) days. This indicates that this treatment delayed the flowering of the plants. As for the effect of different yeast concentrations, it appears from Table No. (8) that the concentration of (10) g/L of dry baking yeast occurred earlier in the flowering date of 50%

of the plants, and the number of days required for that was the lowest reading, which was (49.50) days. The effect of the two-way interaction between (0) tons/acre of organic fertilizer and poultry waste with (10) g/l. of dry baking yeast produced the lowest number of days for flowering for 50% of the plants, amounting to (49.33) days, while they differed significantly with each other. Binary interference coefficients. While the binary interference coefficients delayed (1) ton/dunum of organic fertilizer poultry waste mixed with (0 and 5) g/l. of dry yeast, which achieved (51,500) days for the flowering date of 50% of the plants and was Late on that. As for the effect of the binary interaction between the levels of organic fertilizer, poultry waste, and the varieties, it had a significant effect on the flowering date of 50% of the plants, as the binary interaction treatment between the level of (0) tons/acre of organic fertilizer, poultry waste, and the Iranian variety achieved the lowest number of days in that. It reached (49,222) days, while the bilateral interaction treatment between (1) ton/dunum of organic fertilizer and poultry waste with the Argentine variety delayed the flowering date of 50% of the plants, and the longest period for this amounted to (51,667) days. As appears from The same table shows that the bilateral interaction between (10) g/L of dry baker's yeast and the Iranian variety caused an earlier flowering date for 50% of the plants, which gave the lowest number of days in that period, amounting to (49,333) days. While the highest number of days came as a result of For the binary interaction between (0) g/L of dry baking yeast with the Argentine variety, which gave the longest days, it reached (51.111) days. It is noted from the table that there are limited significant effects from the effect of the triple interaction between the organic fertilizer, poultry waste, dry baking yeast, and the varieties, as the triple interaction treatment was achieved between (0) tons/dunum of organic fertilizer, poultry waste, with (10) g/l of dry yeast. With the Iranian variety, the least number of days for flowering for 50% of the plants reached (48,667) days. While the longest period of time for the flowering date for 50% of the plants came to the effect of the triple interaction between (1) ton/acre of organic fertilizer, poultry waste, with (0 and 5) g/L of dry bread yeast with the Argentinean variety, which amounted to (52.667) days.

Table (7) effect of organic fertilizer (poultry waste), dry bread yeast, and varieties on number of flowers per plant during growing season, spring 2023*.

Organicfertilizer(ton.donum)	Dry yeast (g/l.)	Variety		Organic fertilizer x dry yeast
		Iranian	Argentinean	
0	0	35.197 b	34.453 bc	34.825 b
	5	46.597 a	38.947 b	37.772 a
	10	38.660 bc	40.183 a	39.422 a
1.5	0	41.140 a	43.197 a	42.168 a
	5	39.190 b	41.043 a	40.117 a
	10	47.503 a	40.253 ab	38.878 a
2	0	39.270 b	39.233 b	39.252 a
	5	35.860 bc	46.013 a	35.937 b
	10	32.093 c	36.627 b	34.360 b
Organic x variety		Iranian	Argentinean	Organic fertilizer
0		36.818 bc	37.861 b	37.339 b
1.5		39.278 a	41.498 a	40.388 a

2	35.741 c	37.291 c	36.516 b
Dry yeast x variety	Iranian	Argentinean	Dry yeast
0	38.536 a	38.961 a	38.748 a
5	37.216 b	38.668 a	37.942 a
10	36.086 c	39.021 a	37.553 a
variety	37.279 b	38.883 a	

*Coefficients that contain the same alphabet are not significantly different from each other according to Duncan's test at a probability level > 5%.

It is noted from Table (7) when using organic fertilizer(poultry waste) at the level of (1) ton/dunum achieved the highest number of flowers per plant, which reached (40,388), and it was significantly superior to the levels (0 and 2) tons/dunum of organic fertilizer. While there was no significant effect of dry baking yeast on the number of flowers per plant. As for the varieties, the Argentinean variety was significantly superior in number of flowers per plant to the Iranian variety, and the number of flowers reached (38,883 and 37,279), respectively. We also note that there are clear significant effects of the effect of the binary interaction between the organic fertilizer and poultry waste with dry baking yeast, as the binary interaction treatment between (1) ton/dunum of organic fertilizer and poultry waste with (0 and 5) g/l. of dry baking yeast achieved the highest results. The number of total flowers per plant reached (42.168 and 0.117), respectively, which significantly outperformed the interaction coefficients between (0) tons/acre of organic fertilizer (poultry waste) with (0) g/l. of dry baker's yeast, as it reached (34.825). Flowers produced by the double interaction between (2) tons/acre of organic fertilizer and poultry waste with (5 and 10) g/liter of dry yeast, which amounted to (35.937 and 34.367) flowers per plant. Table (7) indicated that The dual interaction between (1) ton/dunum of organic fertilizer and poultry waste with the Argentinean variety achieved the highest number of flowers per plant, amounting to (41,498), and was significantly superior to some of the dual interaction treatments, while the dual interaction treatment achieved (2) tons/durum of fertilizer. Organic poultry waste with the Iranian variety had the lowest number of days for the plant to flower, reaching (35,741) flowers per plant. It was also due to the effect of the binary interaction between yeast. Dry bread and varieties had a significant effect on this trait, as the double interaction treatment (10) grams per liter of dry bread yeast with the Argentine variety achieved the highest number of flowers per plant, amounting to (39,021), and the lowest number of flowers came as a result of the double interaction effect between (10) g/l. of dry yeast with the Iranian variety, which amounted to (36,086) flowers per plant. As for the effect of the triple interaction between the three factors on this trait, the triple interaction treatment outperformed (1) ton/dunum of organic fertilizer, with (10) g/l. of dry yeast with the Iranian variety had the highest number of flowers per plant reaching (47.503). It was significantly superior to some of the triple interaction treatments, which were (32.093) as a result of the effect of the triple interaction between each of (2) tons/acre of organic fertilizer, poultry waste with (10) g/L of dry bread yeast, Iranian variety.

Discussion

Through tables (2, 3 , 4, 5 and 7), which represent the characteristics of vegetative growth (the number of branches per plant, the percentage of dry matter in the vegetative growth, the percentage total chlorophyll , the 50% flowering date of plants and the number of flowers per

plant), that the levels of organic fertilizer and poultry waste significantly affected the characteristics of vegetative growth And the flowering of the bean plant. This result can be explained by the positive role of organic fertilizer, poultry waste, in improving the vegetative and flowering growth, through what it contains of the necessary nutrients for the vegetative and flowering growth of the plant, and that organic fertilization is one of the important methods for supplying the plants with the needs of nutrients without any effect. Negative impact on the environment. Studies conducted by (Cook 1972) confirmed that organic fertilizers work to improve the structural characteristics of the soil. This improvement leads to an increase in water readiness for the plant, improves water seepage and aeration, encourages growth by providing pores of appropriate sizes, and prevents the soil from turning into solid soil when It prevents drought and prevents poor ventilation when saturated with water. When organic fertilizers decompose in the soil, nutrients may be released in a manner consistent with the plant's absorption capacity. The use of poultry manure improves the growth of horticultural crops (Boateng et al. 2006). Microorganisms in the soil work to decompose organic molecules and release inorganic phosphorus using phosphate energy, thus improving the availability of phosphorus and its readiness for crop growth. Many studies have confirmed the importance of adding organic matter to the soil for its main role in improving the various physical, chemical and biological properties of the soil, such as soil structure. Its aeration, water permeability, root penetration, increased exchange capacity, microorganism activity, and increased number, in addition to improving its regulatory capacity and increasing its readiness for nutrients, is an important and rich source of many nutrients, especially nitrogen, phosphorus, and potassium, in addition to containing micronutrients (Adams 1992). Abd-Elmohsen (2003) stated that organic fertilizers are natural materials and a good medium for the interaction of microorganisms. Given the importance of organic fertilizers, studies have focused on them recently after reliance was It is almost limited to mineral fertilizers after studies showed the negative effects of mineral fertilizers, especially nitrogen, on environmental pollution. These results were as stated by (Abd-Elmohsen, 2003; Banu et al., 2013; Mthabisi 2016; Alhrout et al., 2016, Eberechi, 2018, and Ahmad and Arian, 2021, and Sibel et al. 2022) who stated through their research results that organic fertilizer (poultry manure) caused positive significant effects on the characteristics of vegetative growth and the content of chlorophyll and flowering in bean plants. As shown by the results of tables (1, 6 and 7) that dry yeast and the concentrations used significantly affected the characteristics of plant height, the date of emergence of flower buds, and the flowering date of 50% of the plants. This result may be explained by the role of dry yeast in its effect on the characteristics of vegetative and flowering growth in bean plants, because yeast is the natural source of cytokinins. It 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 activates, and stimulates cell division, elongation, and protein synthesis, DNA and chlorophyll formation (El-Desouky et al., 1998, and Wanas, 2002). Yeast also contains substances or factors that protect against cell freezing, sugars and proteins, in addition to amino acids. (Mahmoued, 2001). Yeast is an important source of cytokinin and has a major role in its effect on vegetative growth and productivity by improving flower formation (Amer 2004). Our results were in line with what was stated by (El-Tohamy and El-Greadly, 2007; Abdel-Hakim et al., 2012; Al-Amery and Mohammed, 2017; Marhoon et al., 2018, and Ramadan, 2020). Spraying bean

plants with concentrations of dry yeast had a significant effect on the characteristics of vegetative growth. As for the effect of varieties on the characteristics of vegetative and flowering growth, we find in tables (1, 2, , 3, 4, 5) which are represented by the height of the plant, the number of side per plant, the percentage of dry matter in the vegetative growth, total chlorophyll, the appearance of flower buds and tnumber of flowers per plant.

This result may be explained by the difference in genetic factors in each variety of bean used, and also by the location of the gene responsible for the trait, which is activated and expresses itself by showing the distinctiveness of the trait in each variety, and the difference in the form of showing superiority for one of the varieties under study. There is a difference in the response of each variety to the environmental conditions prevailing at the study site. These results are in line with what was reported by Santalla et al. 2002;Elballa et al. 2004; Rodino et al. 2007; Tryphone and Msolla 2010; Arunga et al. 2010, Bagheri et al. 2017; Alemu et al. 2017; Esho 2019; and Jasim and Esho 2020) who obtained through their studies that the varieties and genetic compositions of beans differ among themselves in the characteristics of vegetative and flowering growth, represented by the height of the plant, the number of side branches for each plant, the percentage of dry matter, the content of chlorophyll, and the date and flowering of 50% of Bean plants. As it appears from the tables above, there are clear positive significant effects of the effect of the double and triple interaction between the factors under study on the characteristics of the vegetative and flowering growth of the bean plant. This result may be explained by the cumulative and combinational effects between the three factors (organic fertilizer, poultry waste, spraying with dry baking yeast, and the varieties).above that there is a cumulative effect of these factors on the characteristics of vegetative growth.

4. Conclusion

Through the results obtained from this study, we conclude that the varieties was significantly different in vegetative traits , the organic fertilizer (poultry manure and concentration of dry yeast affect in some vegetative traits growth

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