



## THE EFFECT OF DIFFERENT LEVELS OF ORGANIC FERTILIZER ON GROWTH, YIELD AND QUALITY TRAITS OF TWO SESAME VARIETIES (*SESAMUM INDICUM* L.)

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### Abstract

A field experiment was carried out in the district of Tarmiyah / Baghdad governorate to study the effect Levels of two types of organic fertilizer sheep manure, poultry manure on the growth, yield and oil traits of two sesame varieties *Sesamum indicum* L. for the Summer season 2020. The experiment was applied according to the Randomized Complete Block Design (R.C.B.D) with Split Plot System, using two varieties of sesame (Ishtar and Babel) and two types of organic fertilizer (sheep manure, poultry manure) with four levels for each of them are (0, 6, 8 and 12 tons. ha<sup>-1</sup>), where the best was recorded. The significant superiority of Babel variety in the interferences with the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers mentioned in the traits of each of the plant height, the number of branches in the plant and the percentage of ash, whose mean was (171.54, 183.17 cm and 6.98, 8.41 branches. plant<sup>-1</sup> and 4.06, 3.73%) respectively. While the superiority was the best the most significant among the Ishtar variety by interferences with the level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers in the traits of each of the number of capsules per plant (136.13 and 145.24 capsule. plant<sup>-1</sup>), respectively, the number of seeds per capsule (66.98 and 70.12 seed. capsule<sup>-1</sup>), respectively, and the weight of 1000 seeds (4.54 and 5.40 gm) respectively and total seed yield (2.69 and 2.81 tons. ha<sup>-1</sup>), respectively, and oil percentage (57.39 and 60.03%) respectively.

**Keywords:** Sesame, Organic fertilizer, Varieties, Growth, Yield.

## تأثير مستويات مختلفة من السماد العضوي على صفات النمو والحاصل والنوعية لصنفين من محصول السمسم (*Sesamum indicum* L.)

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### المخلص

نفذت تجربة حقلية في قضاء الطارمية / محافظة بغداد لدراسة تأثير نوعين من السماد العضوي (مخلفات الاغنام، مخلفات الدواجن) في صفات النمو والحاصل والزيت لصنفين من السمسم *Sesamum indicum* L. للموسم الزراعي 2020. طبقت التجربة وفق تصميم القطاعات العشوائية الكاملة R.C.B.D بنظام الالواح المنشقة وذلك باستخدام صنفين من السمسم هما عشتار وبابل ونوعين من السماد العضوي مخلفات الاغنام ومخلفات الدواجن وبأربعة مستويات لكل منهما هي 0، 6، 8، و12 طن هكتار<sup>-1</sup>، حيث سجل أفضل تقوق معنوي للصنف بابل بالتداخل مع المستوى السمادي 12 طن هكتار<sup>-1</sup> لنوعي السماد العضوي المذكور في صفات كل من ارتفاع النبات وعدد الافرع بالنبات ونسبة الرماد التي بلغت متوسطاتهم 171.54 و183.17 سم، 6.98 و8.41 فرع نبات<sup>-1</sup>، 4.06 و3.73 % على التوالي. بينما كان التقوق الافضل معنويا هو بين الصنف عشتار بالتداخل مع المستوى 12 طن هكتار<sup>-1</sup> لنوعي السماد العضوي في صفات كل من عدد الكبسولات بالنبات 136.13 و145.24 كبسولة. نبات<sup>-1</sup> على التوالي وعدد البذور بالكبسولة 66.98 و70.12 بذرة كبسولة<sup>-1</sup> على التوالي ووزن 1000 بذرة (4.54 و5.40 غم) على التوالي والحاصل الكلي للبذور 2.69 و2.81 طن هكتار<sup>-1</sup> على التوالي ونسبة الزيت 57.39 و60.03 % على التوالي.

كلمات مفتاحية: السمسم، السماد العضوي، الاصناف، النمو والحاصل.

### Introduction

Sesame (*Sesamum indicum* L.) Belongs to the Sesame family (pedaliaceae), one of the oilseeds crops with high nutritional value, where the oil content in it reaches about (60%), protein more than (25%) and carbohydrates (15%) in addition to it contains Calcium, phosphorous and a group of vitamins (A, B1, B2, B12 and E) and essential amino acids, especially methionine, which has an important role in maintaining the vitality of the body and delaying aging of the skin (13). Sesame is also used in many food industries as an essential ingredient in snacks, sweets and bakery products, and it has an important role in the fields of medicine and health care, all in one product (32) and (22). Sesame is a good crop that is resistant to climatic fluctuations in high and somewhat low temperatures. It has been grown since ancient times in tropical and subtropical areas of Asia and Africa to obtain food oil from it and animal feed (19) and (17). Sesame oil is characterized by its high resistance to oxidative rancidity due

to its content of lignin and tocopherol (Lignin and Tocopherol), and this is what was mentioned (14). Organic Fertilizer (poultry and sheep manure) is one of the main fertilizers in the organic and sustainable management of the soil, as it contains many elements necessary for plant growth and development, regardless of the increase in soil fertility, it works as a soil amendment by adding organic materials to it and also has a major role in improving Soil properties for water retention, aeration and nutrients, and the increase in organic fertilizer has a positive effect on increasing and improving the quality of sesame seeds (20). Despite the economic importance and the high yield of sesame as a result of the increasing demand for vegetable oils, it is noticed the lack of cultivated areas by farmers and their reluctance to grow it in Iraq due to the accompanying problems, for example the dispersal of seeds and infection with many diseases such as fusarium wilt, which leads to a decrease in the yield as quantity and quality (4) and (30), this is what made breeding and improvement programs work continuously and diligently to develop solutions to these problems by reaching varieties resistant to spoilage and plant diseases that over years led to an increase in the yield and quality. In Iraq, the local variety was introduced to create mutations and the varieties were introduced (Ishtar, Babel And Rafidain) by Gama ray (8). These varieties are distinguished by their high superiority over the original by many quantitative and qualitative traits The research problem is not in the infection of sesame with Fusarium wilt disease, but rather in increasing the quantitative and qualitative characteristics of sesame (2) and (24). The aim of the study is to reduce the risks of using chemical fertilizers and replace them with more effective and safer organic fertilizers on human health and the environment and to select the best variety and level of organic fertilizer and the extent to which the sesame crop benefits from this addition and its reflection on the growth, yield and quality traits of the crop and the lack of local research on the sesame crop despite its economic importance

### **Materials and Methods**

A field experiment was carried out in the summer season 2020 in Baghdad governorate / Tarmiyah district to study the effect of adding different levels of organic Fertilizer (sheep manure and poultry manure) on the yield and quality traits of two varieties of the sesame crop (*Sesamum indicum* L). Soil samples were taken at random from the experimental field area at a depth of 15 and 30 cm from the soil surface before soil the physical and chemical soil properties as shown in Table (1). Also, the organic fertilizer used in the experiment was analyzed according to Table (2), The experimental field well prepared for experiment through two plowing, leveling, compaction The experiment was applied using a randomized complete block design (RCBD) according to a split-plot system with three replications, where the Varieties occupied the main factor represented by two types (Ishtar and Babel). As for the organic fertilizer, the secondary factor was occupied by two types of it, the first being sheep manure with four concentrations (0, 6, 8, 12 tons. ha<sup>-1</sup>), and the second is poultry residues with four levels (0, 6, 8, 12 tons. ha<sup>-1</sup>). Organic Fertilizer was added after tillage, smoothing and leveling process. The experiment containing (16) experimental units with an area of (3 m x 4 m) each unit i.e. (12 m<sup>2</sup>), and the cultivation was carried out with a Rows system with a number of (5 Rows), where (3-5 seeds) were Planted in one hole at a depth ( 2-3 cm), planting (15/5/2020), the distance between one hole and another (30 cm) and between one row and another (80 cm), The field was irrigated immediately after planting, and then the field was

irrigated according to plant needs and soil moisture. The crop was harvested when signs of ripeness appeared (18 / 9 /2020) as yellowing stems and leaves, hardening of the seeds, and before the capsules were opened. Five plants were taken randomly from the mean rows for each experimental unit for the purpose of studying the characteristics of the research. The Studied Traits were as follow:

The average Plant height (cm) was measured for five plants selected from the two rows middle for each experimental unit, and the measurement was taken from the base of the plant at the soil surface to the top of the terminal leaf. The number of branches of the plant (branch plant<sup>-1</sup>) was calculated. Plant-1 a week before harvest by selecting five plants from the middle rows prepared for measurement. Take the number of capsules per plant (capsule plant<sup>-1</sup>) a week before harvest, by choosing five plants from the middle rows prepared for measurement, as mentioned above. Number of seeds per capsule (seed capsule-1) five samples were taken from each experimental unit, and one capsule was wasted, and then the number of seeds in it was counted . Weighing of 1000 seeds (gm), randomly selected after dispersing the capsules for each experimental unit, weighed with a sensitive scale, and their weight was recorded. Total seed yield (tons ha<sup>-1</sup>) As for the seed yield, It was calculated from the excessive seeds of the harvested area remaining plants were harvested in the rows after taking the five plants from them to make measurements on them for each experimental unit. These plants were dried and weighed after being sifted and cleaned of impurities. Then the weight of the five plants from which they were taken was added and the weight was converted into a ton. ha<sup>-1</sup>. The oil percentage (%) was estimated by using the Soxhlet apparatus and by following the standard method as mentioned in (7). The percentage of ash was estimated by means of the incineration furnace at a temperature of (550 ° C) for a period of five hours and until the stability of weight and according to the method(6 and 7) . Statistical analysis of all results was carried out on the basis of variance analysis of the studied traits according to global experiments by Randomized Complete Block Design (R.C.B.D) according to the split plot system in the program (Statistical Analysis System SAS-V9, 2002), and the averages of the transactions were compared using the Duncan multi-range test with a probability level (5%), According to this test, the averages followed by similar alphabet letters do not significant differences from each other and followed by different letters, as they differ from each other significant differences (23).

**Table 1 Shows some Traits of the Physical and Chemical of the Soil**

The Character	Unit	The value
pH		<b>7.38</b>
E.C	ds.m <sup>-1</sup>	<b>1.29</b>
N (available)	mg. kg <sup>-1</sup>	<b>31.05</b>
K (available)	mg. kg <sup>-1</sup>	<b>184.20</b>
P (available)	mg. kg <sup>-1</sup>	<b>10.33</b>
Organic matter	g. kg <sup>-1</sup>	<b>9.16</b>
Soil Texture		<b>Mixture clay</b>
pH water		<b>7.6</b>
E.C water	ds.m <sup>-1</sup>	<b>1.42</b>

**Table 2 Analysis of Organic Fertilizers used in the Research**

Element	Organic Fertilizer	N %	P %	K %	Mg %
Sheep Manure		1.36	0.31	1.02	0.165
Poultry Manure		1.41	1.24	1.10	0.190

## Results and Discussion

Table 3, which shows the effect of the varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of plant height for sesame, indicates that Babel variety recorded a significant superiority over Ishtar variety by giving it the highest arithmetic average of (166.64 cm), while the lowest average was recorded by the variety. Ishtar, who reached (136.22 cm). As for the average organic fertilizer (sheep manure), there are no significant differences between the levels. With regard to the interferences between varieties and sheep manure, we note a significant superiority of the variety Babel in the interaction with the fertilizer level (12 tons. ha<sup>-1</sup>), as it recorded the highest average value (171.54 cm) and a significant superiority over all other interaction, while the least average interference was between the variety Ishtar. And the control treatment, which was (131.13 cm). We still, at the same table, find a significant superiority for the Babel variety by giving it the highest average (175.75 cm) and a significant superiority over the Ishtar variety, which scored the lowest average (142.92 cm). With regard to the average of organic fertilizer (poultry manure), there were no significant differences between the levels. With regard to the interferences between varieties and poultry manure, we note a significant superiority of the variety Babel with the interference with the fertilizer level (12 tons. ha<sup>-1</sup>), as it recorded the highest average value (183.17 cm) and a significant superiority over all other interferences, while the interference between the variety Ishtar was recorded and the control treatment was less average Reach (134.80 cm). We can explain these results to the nature of the genotype of the variety and the role of organic fertilizer because it contains essential nutrients. Table (2) for photosynthesis, respiration, and the process of protoplasmic structure (5). Its ears are involved in building and synthesizing amino acids (DNA and RNA) Necessary for cell division and elongation and especially Stem cells and thus increase plant height and these results are consistent with (12) and (10). The reason is due to the organic fertilizer containing nitrogen and its role in the production of auxin, which encourages cell division and cell elongation, as well as deepening the roots and their penetration into the soil, which increases its stability, and this can increase plant height(9). We conclude from the foregoing that the best two interferences for this trait were between the Babel variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for both sheep and poultry manure.

**Table (3) The effect of varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of plant height (cm).**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	131.13 h	135.50 G	138.46 f	139.82 e	136.22 b

	Babel	160.33 d	166.0 3 C	168.68 b	171.54 a	166.64 a
	Average of the Organic Fertilizer	145.73 a	150.7 7 A	153.57 a	155.68 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	134.80 h	141.1 1 G	144.20 f	151.57 e	142.92 b
	Babel	168.86 d	173.6 5 C	177.35 b	183.17 a	175.75 a
	Average of the Organic Fertilizer	151.83 a	157.3 8 A	160.78 a	167.37 a	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

## 2- The number of branches of the plant (branch. plant<sup>-1</sup>): -

We infer from the results of Table (4), which shows the effect of varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the quality of the number of branches in the plant. The presence of a significant superiority between the two varieties Ishtar and Babel, as the variety Babel was significant superior, with the highest average being (6.27 branch. plant<sup>-1</sup>). On the contrary, the variety Ishtar scored the lowest average of (3.52 branch. plant<sup>-1</sup>). With regard to the average of organic fertilizer (sheep manure), the level of fertilizer exceeded (12 tons. ha<sup>-1</sup>) by scoring the highest average of (5.49 branch. plant<sup>-1</sup>) . this superiority was not significant with other fertilizer levels, as the control treatment recorded the lowest average, which reached (4.30 branch. plant<sup>-1</sup>). When looking at the results of the interferences between varieties and organic fertilizer (sheep manure), we notice a significant superiority of the interference treatment between the variety of Babel and the fertilizer level (12 tons. ha<sup>-1</sup>) by recording the highest average of (6.98 branch. plant<sup>-1</sup>) and a significant superiority over all other interferences treatments. On the contrary, the interference treatment was recorded between the Ishtar variety and the control treatment the lowest average (3.01 branch. plant<sup>-1</sup>). When tracking the results of the same table, we find a significant superiority for the Babel variety, which scored the highest average (7.62 branch. plant<sup>-1</sup>), and a significant superiority over the Ishtar variety, which scored the lowest average (4.06 branch. plant<sup>-1</sup>). With regard to the average of poultry manure, it exceeded the fertilizer level (12 tons. ha<sup>-1</sup>) by registering the highest average of (6.87 branch. plant<sup>-1</sup>), but this superiority was not significant with other levels, while the control treatment recorded the lowest average of (4.74 branch. plant<sup>-1</sup>). Whereas when observing the results of the interferences between the varieties and the organic fertilizer (poultry manure), the interference between the variety Babel and

the fertilizer level (12 tons. ha<sup>-1</sup>) gave the highest average of (8.41 branch. plant<sup>-1</sup>) with a significant superiority over all other interferences treatments and the treatment was The least average interference is between variety Ishtar and the control treatment was (2.94 branch. plant<sup>-1</sup>). The reason may be due to the production capacity, efficiency and nature of the variety in the formation of a large number of branches and its response to organic fertilization as well as the role of organic fertilizer that decomposes during the formation stages of plant branches in order to provide the plant with essential nutrients that help increase the photosynthesis process and vegetative growth of sesame (29) and (3). We conclude from the foregoing that the best two interfering treatments for the trait were between the Babel variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for sheep and poultry manure.

**Table (4) The effect of the varieties and organic fertilizer (sheep manure and poultry manure) and the interference between them in the trait of the number of branches in the plant (branch. plant<sup>-1</sup>)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	3.01 h	3.28 g	3.78 f	4.00 e	3.52 b
	Babel	5.59 d	5.91 c	6.61 b	6.98 a	6.27 a
	Average of the Organic Fertilizer	4.30 a	4.59 a	5.19 a	5.49 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	2.94 h	3.82 g	4.16 f	5.34 e	4.06 b
	Babel	6.54 d	7.61 c	7.94 b	8.41 a	7.62 a
	Average of the Organic Fertilizer	4.74 a	5.71 a	6.05 a	6.87 a	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

### 3- Number of capsules per plant (capsule. plant<sup>-1</sup>): -

We notice from the results of Table (5) the significant superiority of the variety Ishtar in the trait of the number of capsules in the plant, which scored the highest mean of (128.87 capsule. plant<sup>-1</sup>), while the variety Babel scored the lowest mean of (105.48 capsules. plant<sup>-1</sup>). Regarding organic fertilizer (sheep manure), the fertilizer level (12 tons. ha<sup>-1</sup>) gave the highest average (124.33 capsule. plant<sup>-1</sup>), with a significant superiority over all other levels, but the control treatment recorded the lowest average of (110.07 capsule. plant<sup>-1</sup>) . As for the averages of interference between varieties and sheep manure, the interference treatment between the variety Ishtar and the fertilizer level (12 tons. ha<sup>-1</sup>) was recorded with the highest average amounting to (136.13 capsule. plant<sup>-1</sup>), with a significant superiority over all other interference treatments. On the contrary, the interference treatment was

recorded between The cultivar is Babel and the control treatment was the lowest average (99.30 capsule. plant<sup>-1</sup>). The results of the same table show significant superiority of the variety Ishtar with the highest average (136.30 capsule. plant<sup>-1</sup>), while the variety Babel scored the lowest average (103.53 capsule. plant<sup>-1</sup>). As for the average organic fertilizer (poultry manure), the levels of (6, 8 and 12 tons. ha<sup>-1</sup>) were recorded, the highest average was (118.85, 121.96 and 125.10 capsule. plant<sup>-1</sup>), respectively, and thus significantly superiority the control treatment that was recorded. The lowest average was (113.76 capsule. plant<sup>-1</sup>). The same table also shows the results of the interferences between varieties and poultry manure, as the interference treatment between the variety Ishtar and the level (12 tons. ha<sup>-1</sup>) was significantly superior by scoring the highest average of (145.24 capsule. plant<sup>-1</sup>) and a significant superiority over all other interference treatments on the contrary. The interference treatment between the variety Babel and the control treatment recorded the lowest average (100.21 capsule. plant<sup>-1</sup>). The reason for the superiority of the Ishtar variety may be due to the large number of leaves and the shortness of the phalanges that characterize the variety, where the buds originate from the armpits of the leaves and thus the distances between the capsules decrease and the increase in their number [4]. In addition to the positive role of organic fertilizer in increasing the plant height and the number of branches of the mentioned variety, it contributed to the increase in the number of capsules compared to the Babel variety (21). We conclude from the foregoing that the best two interfering treatments for this trait are between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers.

**Table (5) the effect of the varieties and organic fertilizer (sheep manure and poultry manure) and the interference between them in the trait of the number of capsules per plant (capsule. Plant<sup>-1</sup>)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	120.83 d	125.7 0 c	132.84 b	136.13 a	128.87 a
	Babel	99.30 h	102.3 6 g	107.75 f	112.52 e	105.48 b
	Average of the Organic Fertilizer	110.07 c	114.0 3 bc	120.30 ab	124.33 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	127.31 d	133.7 2 c	138.95 b	145.24 a	136.30 a
	Babel	100.21 g	103.9 8 f	104.97 e	104.96 e	103.53 b



	Average of the Organic Fertilizer	113.76 b	118.8 5 a	121.96 a	125.10 a	
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- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

#### 4- Number of seeds per capsule (seed. capsule<sup>-1</sup>): -

When presenting the results of Table (6), which shows the effect of the varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of the number of seeds in the capsule, we notice a significant superiority of the variety Ishtar with the highest average of (63.55 seed. capsule<sup>-1</sup>), while the variety scored Babel with the lowest average of (57.88 seed. capsule<sup>-1</sup>). With regard to the levels of organic fertilizer (sheep manure), the level of fertilizer (12 tons. ha<sup>-1</sup>) was recorded the highest arithmetic average of two values (62.93 seed. capsule<sup>-1</sup>), which was significantly superior to all other fertilizer levels. While gave The control treatment is the lowest average of its value (58.59 seed. capsule<sup>-1</sup>). With regard to the interferences between varieties and sheep manure, we note a significant superiority of the interference between the variety Ishtar with the fertilizer level (12 tons. ha<sup>-1</sup>) by giving it the highest arithmetic average of (66.98 seed. capsule<sup>-1</sup>) and a significant superiority over all other interferences, on the contrary, the interference record Among the variety Babel, with the control treatment, the lowest average was (56.53 seed. capsule<sup>-1</sup>). When observing the same table, we find that the Ishtar variety significantly superiority on the Babel variety by scoring the highest average (66.02 seed. capsule<sup>-1</sup>), while the Babel variety scored the lowest average (59.23 seed. capsule<sup>-1</sup>). As for the average of organic fertilizer (poultry manure), the level of fertilizer (12 tons. ha<sup>-1</sup>) recorded the highest average, reaching (66.44 seed. capsule<sup>-1</sup>), with a significant superiority at all fertilizer levels, but the control treatment gave the lowest average of (58.92 seed. capsule<sup>-1</sup>). With regard to the results of the interferences between varieties and poultry manure, we find a significant superiority of the interference between the variety Ishtar and the fertilizer level (12 tons. ha<sup>-1</sup>), registering the highest average of (70.12 seed. capsule<sup>-1</sup>) and a significant superiority over all other interferences other than that. The interference between variety Babel was recorded. The control treatment was the lowest average (56.45 seed. capsule<sup>-1</sup>). The reason for this difference may be due to the nature of the genotype of the variety to increase the good pollination rate, because the pollination is mixed by insects, which increases the number of seeds in the capsule in addition to the role of organic fertilizer that contains many organic acids that work On dissolving phosphate rock and then increasing phosphorus in the soil and its ease of absorption by the roots, as phosphorus is considered one of the basic components of nucleic acids, and this is why it Plays the role of in the proliferation of plant components, including the seeds, and these results are consistent with what was stated by (15),(28) and (27). We conclude from the foregoing that the two best interferences of the above trait were between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for both types of organic fertilizers.

**Table (6) the effect of varieties and organic fertilizer (sheep manure and poultry manure) and the interference between them in the trait of the number of seeds per capsule (seed. capsule<sup>-1</sup>)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	60.64 d	62.12 c	64.48 b	66.98 A	63.55 a
	Babel	56.53 g	57.67 f	58.47 e	58.88 E	57.88 b
	Average of the Organic Fertilizer	58.59 c	59.90 bc	61.47 ab	62.93 A	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	61.38 e	64.64 c	67.95 b	70.12 A	66.02 a
	Babel	56.45 h	57.85 g	59.88 f	62.74 D	59.23 b
	Average of the Organic Fertilizer	58.92 c	61.25 b	63.91 b	66.44 A	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

#### 5- Weight of 1000 seeds (gm): -

When going into the results of Table (7), which shows a significant superiority of the variety Ishtar with the highest mean (4.03 gm) over the variety Babel, which scored the lowest average of (3.85 gm). With regard to the average of organic fertilizer (sheep manure), we find a significant superiority for the fertilizer level (12 tons. ha<sup>-1</sup>), by registering the highest arithmetic mean of (4.34 gm), significant superiority at all other levels, while the control treatment recorded the lowest average of (3.62 gm). When tracking the results of the interferences between varieties and sheep manure in the same table, we find a significant superiority for the interference treatment between the variety Ishtar with the level (12 tons. ha<sup>-1</sup>) with the highest average of (4.54 gm) and this is a significant superiority over all other interferences treatments. On the contrary, the treatment was recorded. The interference between the variety Babel with the control treatment was the lowest average (3.61 gm). We also note from the results of Table (7) the superiority of the Ishtar variety with the highest average (4.43 gm) over the Babel variety, which scored the lowest average of (4.34 gm), but this superiority was not significant between the two mentioned varieties with regard to levels of organic fertilizer (poultry manure). Significant superiority of the fertilizer level (12 tons. ha<sup>-1</sup>) by giving it the highest average of (5.18 gm), significantly superior to the other levels, While the control treatment gave the lowest average of (3.83 gm). When tracking the results of the interferences between varieties and poultry manure, we find that the interference treatment of the variety Ishtar superiority the level (12 tons. ha<sup>-1</sup>) by registering the highest arithmetic average of (5.40 gm) as it significantly superiority all other interference treatments at the same time. The interference treatment between the variety Babel. With the control

treatment the was recorded lowest average was (3.80 gm). The reason for these results may be due to the nature of the genotype of the variety and the role of organic fertilizer, which increases the readiness of phosphorous and nutrients in the soil, which increases the efficiency of absorption of these substances by the roots for the role of organic fertilizer in the soil retaining its moisture for a longer period, thus increasing the photosynthesis process and increasing its output Building proteins and increasing the accumulation of manufactured materials transported from the source to the downstream, thus increasing the fullness of the seed and increasing its weight, and this is consistent with (18) and (1). We conclude from the foregoing that the best two interfering combinations are between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers used in the research.

**Table (7) the effect of varieties and organic fertilizer (sheep manure and poultry manure) and the interference between them in the trait the weight of 1000 seeds (gm)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	3.62 e	3.85 c	4.11 d	4.54 a	4.03 a
	Babel	3.61 e	3.76 d	3.88 c	4.14 b	3.85 b
	Average of the Organic Fertilizer	3.62 d	3.80 c	3.99 b	4.34 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	3.86 d	4.03 cd	4.41 c	5.40 a	4.43 a
	Babel	3.80 d	4.13 cd	4.47 c	4.97 b	4.34 a
	Average of the Organic Fertilizer	3.83 d	4.08 c	4.44 b	5.18 a	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

#### 6- Seed yield (tons. ha<sup>-1</sup>): -

When looking at the results of Table (8), which shows the effect of the varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the total yield of seeds, we find a significant superiority for the variety Ishtar with the highest average of (2.32 tons. ha<sup>-1</sup>) and the lowest average for the variety Babel reached ( 1.52 tons. ha<sup>-1</sup>). Regarding organic fertilizer, the two levels (8 and 12 tons. ha<sup>-1</sup>) were recorded for sheep manure with the best significant superiority with the highest average reaching (2.14 and 2.25 tons. ha<sup>-1</sup>) respectively, while the lowest average recorded by the control treatment was (1.46 tons. ha<sup>-1</sup>). . When tracking the results of the interference between varieties and sheep manure, the interference between variety Ishtar and the fertilizer level (12 tons. ha<sup>-1</sup>) gave the highest average (2.69 tons. ha<sup>-1</sup>), as it was significantly superior to all other interferences. Otherwise, the interference between variety was given by Babel and the control treatment. The lowest average was (1.18 tons. ha<sup>-1</sup>). When tracking the results of the same table, we

notice a significant superiority for the variety Ishtar, which recorded the highest average (2.48 tons. ha<sup>-1</sup>). At the same time, the variety Babel recorded the lowest average of (1.70 tons. ha<sup>-1</sup>). We notice from the average organic fertilizer (poultry manure) a significant superiority for the level (12 tons. ha<sup>-1</sup>), with the highest average being (2.46 tons. ha<sup>-1</sup>) and a significant superiority at all other levels. In contrast, the control treatment recorded the lowest average of (1.62 tons. ha<sup>-1</sup>). As for the interferences between varieties and poultry manure, the interference between the variety Ishtar and the fertilizer level (12 tons. ha<sup>-1</sup>) was higher than the average (2.81 tons. ha<sup>-1</sup>), on the contrary, the interference between the variety Babel with the control treatment was the lowest average of (1.37 tons. ha<sup>-1</sup>). The reason may be due to the role of organic fertilizers in improving the physical, chemical and biological properties of the soil, increasing its ability to retain water and increasing its content of nutrients, especially (N, P, K). The decomposition of organic fertilizers produces a number of amino and organic acids that play an important role in biological processes. For the plant, which reflected positively on some of the yield traits (number of capsules per plant, number of seeds per capsule, weight of 1000 seeds) and thus an increase in the total yield, which is consistent with (20), (11) and (16). From the above, we conclude that the two best interferences for this trait were between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers.

**Table (8) the effect of varieties and organic fertilizer (sheep manure and poultry manure) and the interference between them on the trait of the total yield of seeds (tons. ha<sup>-1</sup>)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	1.75 d	2.29 c	2.57 b	2.69 A	2.32 a
	Babel	1.18 f	1.39 e	1.72 d	1.81 D	1.52 b
	Average of the Organic Fertilizer	1.46 b	1.84 ab	2.14 a	2.25 A	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	1.88 a	2.57 c	2.68 b	2.81 A	2.48 a
	Babel	1.37 h	1.58 g	1.74 f	2.11 D	1.70 b
	Average of the Organic Fertilizer	1.62 c	2.07 b	2.21 ab	2.46 A	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

### 7- Oil percentage (%):

Table (9) shows the effect of the varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of the oil percentage. We note the superiority of the variety Ishtar significantly, as it scored the highest average of (55.64%), while Babel scored the lowest average of (52.75%). As for organic fertilizer (sheep manure), the two levels (8 and 12 tons. ha<sup>-1</sup>) recorded the highest two arithmetic averages, reaching (54.88 and 55.71%), respectively. With regard to the interferences treatments between varieties and sheep manure, we note a

significant superiority of the interference treatment between the variety Ishtar and the level (12 tons. ha<sup>-1</sup>) over all other interference treatments with the highest average of (57.39%). While, the interference treatment between the variety Babel and the control treatment was recorded. The lowest average was (51.25%). We are still at the same table, as the Ishtar variety superiority in significance by scoring the highest average of (57.15%), while the Babel variety scored the lowest average of (53.95%). With regard to the levels of organic fertilizer (poultry manure), we note a significant superiority of the fertilizer level (12 tons. ha<sup>-1</sup>), registering the highest average of (58.05%) and a significant superiority over all other fertilizer levels. On the contrary, the control treatment recorded the lowest average of (52.98%). When tracking the results of the interferences between varieties and poultry manure, the interference treatment between the variety Ishtar and the level (12 tons. ha<sup>-1</sup>) outperformed it by giving it the highest average of (60.03%) and a significant superiority over all other interferences treatments. In contrast, the interference treatment was recorded between the variety Babel and the control treatment The lowest average was (51.90%). Perhaps the reason for this superiority is due to the nature of the genotype of the variety Ishtar and its response To add organic fertilizer, especially poultry manure that contains higher concentrations of nutrients, especially phosphorus, which has an important role in influencing the oil and increasing the elements in the soil and their transfer to the plant through absorption by the roots, thus increasing the saving of dry matter and the formation of fatty acids, and this leads to an increase in the components of the seed. And especially oil (31) and (26). Or perhaps the reason is due to the direct relationship between the weight of 1000 seeds and the percentage of oil (33). We conclude that the best two interferences treatments are between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers.

**Table (9) the effect of varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of oil percentage (%)**

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	53.66 e	55.02 c	56.50 b	57.39 a	55.64 a
	Babel	51.25 g	52.45 f	53.25 e	54.04 d	52.75 b
	Average of the Organic Fertilizer	52.45 c	53.74 b	54.88 a	55.71 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	54.06 d	56.07 c	58.44 b	60.03 a	57.15 a
	Babel	51.90 f	53.66 e	54.18 d	56.07 c	53.95 b
	Average of the Organic Fertilizer	52.98 d	54.86 c	56.31 b	58.05 a	

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

#### 8- Ash percentage (%): -

Table (10) shows the results of the percentage trait of ash. The variety Babel was significantly superior to it by giving it the highest average of (3.74%), while the

variety Ishtar scored the lowest average of (2.61%). As for organic fertilizer (sheep manure), the level (12 tons. ha<sup>-1</sup>) recorded the highest average, reaching (3.52%), but this superiority was not significant with the two levels (8 and 6 tons. ha<sup>-1</sup>), while the superiority was significant with treatment The control, which recorded the lowest average of (2.73%). We are still at the same table that shows the interferences between varieties and organic fertilizer (sheep manure), as the interference treatment of Babel exceeded the fertilizer level (12 tons. ha<sup>-1</sup>) by giving it the highest average of (4.06%) and a significant superiority over all other interferences treatments, unlike That was the lowest arithmetic mean when the interference treatment, the variety Ishtar, and the control treatment was (2.21%). When looking at the results of the same table, we notice a significant superiority for the Babel variety, which scored the highest average (3.43%), while the Ishtar variety gave the lowest average of (2.75%). With regard to the results of the levels of organic fertilizer (poultry manure), it was significantly higher than the level of fertilizer (12 tons. ha<sup>-1</sup>) by the highest average of (3.43%) and a significant superiority over all other fertilizer levels except for the level of fertilizer (8 tons. ha<sup>-1</sup>), which did not differ. At the same time, the control treatment recorded the lowest average of (2.71%). When tracking the results of the interferences between varieties and poultry manure, we notice a significant superiority of the interference treatment between the variety Babel and the fertilizer level (12 tons. ha<sup>-1</sup>), recording the highest average of (3.73%) and a significant superiority over all other interferences treatments, unlike that recorded the interference treatment between the variety Ishtar with a treatment The control is the lowest average (2.40%). Back The difference in the percentage of ash to the nature of the genotype of the variety and the positive role of nitrogen present in the organic fertilizer, which leads to an increase in the thickness of the seed coat through the response of the different varieties to this effect and the increased stimulation of their roots to absorb nitrogen (25). We conclude that the best two interferences treatments are between the Babel variety and the fertilizer level (12 tons. ha<sup>-1</sup>) for the two types of organic fertilizers.

The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Sheep	Ishtar	2.21 g	2.48 f	2.78 e	2.98 d	2.61 b
	Babel	3.25 c	3.76 b	3.91 a	4.06 a	3.74 a
	Average of the Organic Fertilizer	2.73 b	3.12 a	3.35 a	3.52 a	
The Source of the Manure	Varieties	Organic Fertilizer Levels (ton. ha <sup>-1</sup> )				The Average Varieties
		0	6	8	12	
Poultry	Ishtar	2.40 e	2.58 e	2.89 d	3.13 c	2.75 b
	Babel	3.03 c	3.42 b	3.55 b	3.73 a	3.43 a
	Average of the Organic Fertilizer	2.71 C	3.00 bc	3.22 ab	3.43 a	

**Table (10) the effect of varieties and organic fertilizer (sheep and poultry manure) and the interference between them in the trait of Ash percentage (%)**

- Similar letters indicate that there are no significant differences according to the Duncan multi-range test and below the probability level (0.05) .

**Conclusion: -**

We conclude that the best two interferences treatments were between the Ishtar variety and the fertilizer level (12 tons. ha<sup>-1</sup>) of organic fertilizer (sheep manure and poultry manure) in each of the traits (number of capsules per plant, number of seeds per capsule, weight of 1000 seeds, total yield of seeds and the percentage of oil) . Whereas, the two interferences treatments between the Babel variety and the level of fertilizer (12 tons. ha<sup>-1</sup>) for organic fertilizer (sheep manure and poultry manure) were superior in each of the traits (plant height, number of branches in the plant and the percentage of ash).

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