



EFFECT OF ORGANIC MANURE AND SPRAYING WITH BORON IN SEED YIELD AND ITS COMPONENTS FOR BROAD BEAN (*Vicia faba* L.)

Abeer Mohammed AL-Edany and Sabeha Hasson AL-Lamy
College of Al-Mussaib Technical, Al-Furat Al-Awsat Technical University, Iraq

Abstract

A field experiment was conducted during the winter season (2017-2018) in the fields of one of the farmers belonging to Al-Mahaweel district (35 km southwest of Babylon province) to study the effect of adding organic manure (MC EXTRA) and several concentrations of boron in the growth, yield and quality of seeds for broad bean crop (*Vicia faba* L.). The experiment was applied by using the split-plots design, with three replicates according to the Randomized Complete Block Design (RCBD), which included two factors. The first factor included using the spraying with organic manure at four levels (0, 25, 50, 75 g.L⁻¹). The second factor included spraying with the boron element at four levels (0, 25, 50, 75 g.L⁻¹), with the rate of three sprayings the period between one spraying and another is 14 days after cultivating. The product was summarized as follows: The obtained results were summarized as follows: The addition of organic manure led to a significant increase in the traits of the yield (number of pods in plant, length of pod, number of seeds in pod, weight 100 seeds, total yield) which amounted to (21.46 pod.plants⁻¹, 19.08 cm, 5.09 seeds.pod⁻¹, 151.41 g, 22.87 tons.ha⁻¹), respectively. The addition of the boron led to a significant increase in the traits of the yield. The concentration (75 ml.L⁻¹) was significantly excelled on the rest of the concentrations by giving it the highest average for the following traits (number of pods in plant, length of pod, number of seeds in pod, weight 100 seeds, total yield) which amounted to (26.92 pod.plants⁻¹, 21.85 cm, 5.95 seeds.pod⁻¹, 168.67 g, 32.71 tons.ha⁻¹), respectively. The Bi-interaction between organic manure and boron element was influenced, where the combination of (75 g.L⁻¹ + 75 ml.L⁻¹) gave the highest average for the traits of yield (number of pods in plant, length of pod, number of seeds in pod, weight 100 seeds, total yield) which amounted to (28.79 pod.plants⁻¹, 22.56 cm, 6.46 seeds.pod⁻¹, 175.44 g, 38.65 tons.ha⁻¹), respectively.

Keywords : Organic manure, seed yield, broad bean (*Vicia faba* L.).

Introduction

That the rest of the harvest. *Vicia faba* L is an important winter legume crop. Its green and dry seeds are consumed in human nutrition because they contain a high protein content of 25-40% (Natalia *et al.*, 2008). It also contains 58% carbohydrates, mineral elements, fiber and oils Vitamins and especially vitamin B compound and a high percentage of phenic acid (Carmen *et al.*, 2005). This increases the importance of this crop to its high nutritional value for humans and animals. Where the total area cultivated crops of this family of 12-15% of the area of agricultural land on the planet, and the world production of about 27% of the production of grain in the world (Vance and Allen 2000), that the original home of the rest is Central and Western Asia (Cubero The total area cultivated with this crop is about 2327 000 ha with a productivity of 4.85 million tons (Fao, 2004). In Iraq, the total cultivated area of this crop is about 1.25 thousand hectares⁻¹ and productivity The Faculty of Agriculture reached 5.00 tons 1 hectare (Arab Agricultural Statistics 2016). The importance of the rest is to improve soil properties by stabilizing atmospheric nitrogen in the bacterial nodes by co-existing with the risobium bacteria that stimulate the formation of the bacterial nodes so that the rest of the crop interferes with the grains to improve soil conditions (Carmen *et al.*, 2005). The importance of micronutrients, including boron, has been proved in the process of fertilization, fertilization and holding of seeds in legume crops when used directly on the plant's vegetative population (Jassim and Hussein, 2007). Boron is one of the minimum nutrients necessary for flowering, cell division, tubal germination and increased carbohydrate content, which are transferred to active areas of growth through the reproductive stages of plants (Bonilla and Bola, 2009). Al-Anbari *et al.* (2009) showed that the addition of boron to certain concentrations resulted in a significant increase in dry weight average, number of corns in plant, number of seeds by cornea

and seed yield. Studies indicate that spraying organic fertilizer on leaves is usually more efficient and faster in absorption compared to absorption through the roots. Adding organic fertilizer in a paper spraying method has an important role in addressing the state of restriction of the elements' readiness (El-Habbasha *et al.*, 2007). Studies have confirmed that the addition of nitrogen fertilizer on the vegetative plant of soybeans gave a significant effect on all the traits of growth and yield and its components. The seed and protein content was also higher than the comparison treatment given the lowest rate (Jan *et al.*, 2010)

Materials and Methods

A field experiment was carried out during the winter season (2017 - 2018) in the fields of one of the farmers in Mahaweel district (35 km south west of Babil governorate) to study the effect of addition of MC EXTRA and several concentrations of boron in the growth, *Vicia faba* L. The seeds of the Spanish varieties (HABA LUZ DE OTONO) used in the field were used in the research. The organic fertilizer (MC EXTRA) and the NPK were also used as a total fertilizer, in addition to the use of boron in the form of Alitaburu (11% Boron). The experimental area (5 * 4 m) and each experimental unit included (5 m3) and the length of the goat (5 m) and the experimental unit (5 m) And the distance between Marz and another (50 cm). Random samples were taken from sporadic sites of field soil to determine some chemical and physical properties of soil (Table 1). The seeds were sown after being soaked in water for 12 hours, with two seeds in each joura at the top third of the rice and at a depth of 4-5 cm and 35 cm between Joura and another. The agriculture process took place on 25/10/2017. The experiment included four levels of boron (0, 25, 50, 75) ml.L⁻¹ and the second factor included four levels of organic fertilizer (0, 25, 50, 75) mg.L⁻¹.

Table 1: Physical and chemical properties of soil

value	measuring unit	Traits	
7.8	-	PH	
3.4	Dsm	Ece	
45	Mg. Kg ⁻¹	N	
15.27	Mg. Kg ⁻¹	P	
16.4	Mg. Kg ⁻¹	K	
0.85	%	Organic matter	
436	GM. Kg ⁻¹ soil	sand	Soil separators
420	GM. Kg ⁻¹ soil	Glowing	
144	GM. Kg of soil	Clay	
Sand mixed		Tissue	

The field experiment was carried out with the design of the complete sections randomized by the split plot design by three replicates. The main plates included the spraying of the boron element and the secondary sub-plates. In the organic fertilizer, the results showed that the least significant difference was the least significant difference (L S). D) below the level of probability of 5% (narrator and successor of God 1990), using the statistical program EXCEL. The factors of the experiment were sprayed on the vegetative group, where the water solutions of both boron and organic fertilizer were applied according to the required ratios and supplemented with water to the desired concentration. The first tile was after the emergence of (8 leaves) and the number of sprinklers three bribes and the duration between a brush and another 15 days. The spray was added in the early morning in order to avoid damage to the high temperature and dry leaves and burning it was sprayed by dorsal spray with a capacity of (18 liters), and for the treatment of the comparison was sprinkled with water and glowing only. The various crop service operations were carried out from the weeding, weeding, and weeding of one plant after three weeks of germination. The irrigation process was carried out after the completion of the agriculture without immersion and the irrigation of the crop continued during the growing season as needed. The experiment was then manually tested to remove the bushes that grew with the crop. After that, the control of the insect was carried out by using the ASTER SL pesticide at a concentration of 50-35 ml. And then the crop was harvested several times during the second half of April 2018 after the emergence of the final harvest marks on the plant, namely blackness and dry legs, leaves and horns on the plant. The results were analyzed by the statistical program EXCEL, and the statistical averages were compared on the basis of the least significant difference (LSD) at the probability level of 0.05 to find the differences between the arithmetic coefficients of the coefficients (Narrator and Khalaf Allah, 1990). Five plants were randomly taken from each unit of study and all replicates, For the following attributes:

Number of corns / plant

The number of mature corneas of the selected plants was calculated and extracted

Number of seeds / kernels

Take five horns of the specific plants for each experimental unit and calculate the number of seeds in them.

Qurna length / cm

The length of the five horns of the plants identified by the measuring tape was measured and the rate obtained.

The weight of 100 seeds / g 4-

The weight of 100 seeds after extracting from the Qurna of the selected plants was calculated using a sensitive balance and then the calculation of their weight.

Seed yield ton / ha 5-

Five plants were harvested from each experimental unit and their seed weight was taken and converted to a ton/ha.

Results and Discussion

Number of corns in the plant

The increase in the number of corns in the plant is one of the most important factors of economic increase, which is a function of the rate of representation and processing of the products of representation. The results of Table (2) indicate significant differences in the number of corns. The organic manure significantly increased the number of corneas above 75 mg. L⁻¹ on the rest of the coefficients with the highest rate of 21.46 pint compared with the treatment of water spraying, which achieved the lowest rate of 17.97 pods may be due to the role of catalyst in the organic manure in the root and vegetable growth of the plant and this reflected clearly on the number of flowers and led to The increase in the number of corneas, as nitrogen has an important role in increasing the paper area of the plant and thus increase photosynthesis and increase the inflorescences and thus increase the number of corns (Bhangoo and Payorol, 1990) in addition to improving physiological processes in the plant and thus reduce the competition between modern corns and reduce their fall (Ja sim and Obaid, 2013). The fertilizer used contains the cytokinein growth regulator, which in turn has increased the proportion of flowering nodes and thus increased the number of corneas in plants (Arjumand *et al.*, 2013). As for the boron, the results of Table (2) indicate significant differences, with the treatment exceeding 75 ml/L⁻¹. On the rest of the concentrations with a rate of 26.92 pint compared to comparison treatment gave the lowest rate of 12.62 pint may be due to the role of boron in the increase of division of cells and production of pollen and increase the process of fertilization and holding flowers in addition to increasing the transfer of materials manufactured photosynthesis to places where the need in the plant (Nasseralla Blevins, 2002). This is in line with Nasef 2006, that the addition of boron leads to a significant increase in the number of pods in the plant, in addition to the results obtained by Al-Anbari and others (2009) and Al-Isawi and Khrbeet (2011). The combination (75 mg/L- 1.75 ml/L¹) exceeded the highest (28.79) and the lowest (10.75).

Table 2: Effect of spraying manure and boron in the number of corns/plant⁻¹

Organic fertilizers / Boron	0	25	50	75	Average
0	10.75	12.04	13.37	14.31	12.62
25	15.53	17.42	18.78	19.94	17.92
50	20.9	21.68	22.39	22.81	21.94
75	24.71	26.57	27.63	28.79	26.92
Average	17.97	19.43	20.54	21.46	
LSD 0.05	ab=0.771		b=0.385		a=1.685

Number of seeds in Qurna / Qurna

Which is one of the characteristics of the components of the important factor in the rest and represents

the number of fertilized ova, which succeeded in the production of seeds is also one of the most desirable qualities in the election through its importance in increasing the seed yield in the plant, The results of Table (3) indicate significant differences between the two factors. The results showed that the concentration was higher than 75 mg/L⁻¹. The highest mean number of seeds in Qurna was 5.09 seeds compared to the lowest treatment of 4.28 seeds. This is due to the fact that organic fertilizer contains nitrogen, which has resulted in increased vegetative properties, which in turn have a positive and effective effect on the properties of the product. Nitrogen-containing fertilizers have a role in increasing the plant content of free oxycene and gibberellin in the plant. Al-Dulaimi, 2014). The increase in the number of seeds in Qurna due to the addition of organic fertilizer is due to the amount of nutrients released from the decomposition of organic fertilizer in Qurna due to the fact that organic fertilizer provides the plant with a longer period of nutrients, (Jasim and Mhanna, 2014). This is consistent with what he found (Desuki-El *et al.*, 2010). Organic manure contains the cytokinein growth regulator, where plant growth regulators increase the number of corneas in the plant by increasing the number of plant branches and increasing the contract Fruits by controlling the process of flowering and aborting corneas and teck (Al-Bayati *et al.*, 2009) and (Al-Jobori, 2010). In the case of boron, the treatment exceeded 75 ml⁻¹, achieving the highest rate of 5.95 seeds compared to the treatment gave the lowest rate of this attribute amounted to 3.45 seeds and may be due to the role of boron, which affects the growth of the reproductive parts, if needed reproductive parts To high levels of boron to grow naturally, especially the growth of callus in the walls of the cells of the vaccine tubes and this is done through the complex Borat Calose and the need for the tube of the vaccine to high concentrations of boron in the ovary, so the boron in this case plays an important role as an additional Chemical for the growth of the tube This is consistent with what Kharbit *et al.* (2003) found by spraying different concentrations of boron on gew and soybeans and has led to an increase in vitality Pollen length and the length of the tube of the vaccine and reduce the percentage of miscarriage of oocytes and an increase in the average number of flowers floral leg and the number of horns floral lamp. In terms of overlap, the combination (75 mg/l⁻⁷⁵ ml/L⁻¹) achieved the highest (6.46 seed) and the lowest was (3.00 seeds).

Table 3: Effect of spraying organic fertilizer and boron in the number of seeds in Qurna / seed-1

Organic fertilizers Boron	0	25	50	75	Average
0	3.56	3.00	3.63	3.63	3.45
25	3.66	4.13	3.96	4.76	4.13
50	4.43	5.83	5.06	5.5	5.20
75	5.46	5.83	6.03	6.46	5.95
Average	4.28	4.7	4.67	5.09	
LSD 0.05	ab= 0.665		b= 0.332		a=0.348

Length of Qurna / cm 2 3-

The results of Table (4) show significant differences between the treatments. The treatment exceeded 75 mg/l. For organic fertilizer, the highest rate of Qurna length was 19.08 cm. The lowest rate of treatment was 16.98 cm. Organic fertilizer contains nitrogen, which has an important role in

improving the characteristics of vegetative growth and thus improve the characteristics of the crop and increase the proportion of nodes and increase the division of cells, which leads to an increase in the length of Qurna, the provision of nutrients absorbed and increased photosynthesis results in increased transfer of processed food from the leaves To the seeds are thus formed (Kocon, 2010), and the increase in Qurna length may be due to the role of Oxy-Growth Regulator, which increases with organic fertilization (Jassem and Dulaimi, 2014), which increases cell division and expansion. For boron, the treatment was 75 ml. The comparison treatment gave the lowest rate of Qurna length of 14.49 cm. This may be due to the fact that boron has an important role in photosynthesis and enzymatic activity that promotes vegetative growth (Yamagishi and (1994), where boron achieves the natural growth of the plant through its various physiological and anatomical changes and its entry into the cellular membranes (Barry *et al.*, 2006). These results are consistent with the findings of Al-Anbari *et al.*, Masri *et al.*, 2002) when adding different concentrations of boron led to an increase in the characteristics of vegetative growth. The overlap was higher (75 mg/L-1.75 ml/L⁻¹) and the highest rate of Qurna length (22.56 cm), while the lowest rate was (12.46 cm).

Table 4: Effect of Spraying on Lung Fertilizer and Boron in Qurna Length/cm²

Organic fertilizers Boron	0	25	50	75	Average
0	12.46	13.9	15.46	16.13	14.49
25	16.56	16.93	17.33	17.43	17.06
50	18.13	18.8	19.63	20.2	19.19
75	20.76	21.6	22.5	22.56	21.85
Average	16.98	17.80	18.73	19.08	
LSD 0.05	ab= 0.811		b= 0.406		a=0.639

Weight 100 seeds/g 4-

The weight of 100 seeds is one of the components of yield, which is very important and is influenced by the genetic factor and prevailing climatic conditions in addition to the agricultural services provided in the agriculture sector (Bakheita, 2011). The results of Table (5) indicate that there are significant differences between the study parameters, which gave the treatment of organic fertilizer 75 mg. L⁻¹ highest rate of 151.41 g followed by 50 mg concentration. L⁻¹ which achieved a rate of 146.93 g. While the comparison treatment gave the lowest rate of 100 seed weight of 134.23 g. In this case, the results confirm the extent of the response of the rest to organic fertilization. Potassium and nitrogen present in manure help to influence several processes within the plant, such as raising photosynthesis and chlorophyll The efficiency of the use of water, the closure and opening of gaps, the rate of transport and assembly of materials and the delay of aging in the leaves, as well as the increase of leafy area and the reduction of evaporation rates, which is positively reflected on the increase in growth and yield (Abu Dhahi and Yunis, 1988) (Jun *et al.*, 2010) The (Kocon, 2010). If the spray of the plant by fertilizer provides a quantity of the rapidly soluble soluble elements, it can lead to increased uptake of the processed food from the leaves to the seeds. It is possible to compensate for the shortage caused by salt stress and therefore its results are positive in growth and reflected on the outcome, these results are consistent with

what reached (Jasim and Obaid, 2013). In the case of boron, the concentration of 75 mg/l⁻¹ was the highest of the 100-seed weight of 168.67 g compared with the comparison treatment, which gave the lowest rate of 116.12 g. This may be due to the fact that boron stimulates the biological and reproductive processes in flowering, Al-Anbari *et al.*, 2009), as well as increasing the proportion of pollen germination and reducing the miscarriage of eggs, causing an increase in fertilization, which leads to an increase in the number of seeds in Qurna because the percentage of flowering in flowering is influenced by many factors including genetic factors (Allen, 2006) Results with findings (Mahmoud *et al.*, 2006). The combination (75 mg/L⁻¹ +75 ml L⁻¹) had a significant effect on the rest of the interactions, giving the highest rate of 175.44 g, while the comparison gave the lowest rate of 99.033 g.

Table 5: Effect of spraying organic fertilizer and boron in the capacity of 100 seed (g)

Organic fertilizers / Boron	0	25	50	75	Average
0	99.033	116.45	122.45	126.56	116.12
25	128.28	135.1	139.14	142.81	136.33
50	147.66	151.41	155.67	160.85	153.9
75	161.94	166.87	170.44	175.44	168.67
Average	134.23	142.46	146.93	151.41	
LSD0.05	ab=3.671		b=1.836		a=4.848

Total score tone.H⁻¹ 5-

The total seed yield is the final outcome of the effects of environmental and genetic factors and the overlap between them and their effect on the components of the primary and secondary. The results of Table (6) indicate that there are significant differences between the experimental parameters, with a concentration of 75 mg.l. The highest rate of seed yield was 41.86 tons. In comparison with the comparison treatment, the lowest rate was 7.9 tons. This may be due to the superior characteristics of the number of seeds in Qurna, the number of horns in the plant and 100 seeds. This results in higher than total yield. The percentage of nitrogen in the organic fertilizer has a significant effect on all the qualities described In which it plays a positive role in increasing the rates of green properties which lead to increased photosynthesis and g Other studies have confirmed that there is a significant increase in the weight of 100 seeds for soybean yield by increasing nitrogen fertilization (Shuwail and Abbas, 1983). These results are consistent with what Jasim, 2007) and Thalooth *et al.* (2006). The yield was significantly increased when the boron spray was sprayed with a concentration of 75 ml⁻¹ and a high yield of 28.08 tons. E⁻¹, compared with the comparison treatment, which gave the lowest average of 17.94 tons. The increase in seed yield with increased boron concentration is mainly due to its superiority in the number of fertile corns and the number of seeds in Qurna. Borton is also able to increase the efficiency of the plant in increasing the nutrients transferred to the final seed, which positively affects the production of the plant by increasing the components of the plant and then Overall increase (Pradeep and El-Iamathi, 2007) and Sarhan (Al-Jumaily, 2015) As for the double overlap between the two study groups, the combination was higher (75 mg/l⁻¹ + 75 ml/l⁻¹), which gave the highest overall mean of 50.25 tons.

E.1, while the lowest interference rate was for the comparison treatment was 5.84 Ton.h⁻¹.

Table 6: Effect of spraying organic fertilizer and boron in the total ton.

Organic fertilizers / Boron	0	25	50	75	Average
0	5.84	11.23	21.05	33.64	17.94
25	6.48	14.97	29.47	39.81	22.68
50	9.15	15.94	27.16	43.73	23.99
75	10.12	20.86	31.08	50.25	28.08
Average	7.9	15.75	27.19	41.86	
LSD0.05	ab= 2.75		b= 1.37		a=1.06

Recommendations

We recommend the use of paper spray for the boron component of the remaining 75 ml. L⁻¹ in order to obtain the best vegetative growth and increase in the occurrence where it was noted increase in the increase of concentrations while taking into account the avoidance of the use of high concentrations of toxicity in addition to the use of organic fertilizer Rasha on the vegetative because of its positive impact in improving the characteristics of vegetative growth and increase, We recommend the use of fertilizer Rasha on the vegetative if the elements in this case are more ready for absorption in addition to the absence of any loss of these elements .

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