Impact of Some Organic Manure with Chemical Fertilizers on Growth and Yield of Broad Bean (*Vicia faba* L.) Grown in Newly Cultivated Land

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Abstract. The possibility of improving growth and yield of broad bean (*Vicia faba* L.) plants grown in newly cultivated land was conducted during the two successive seasons of 2018 and 2019. For achieving this aim, broad bean plants were fertilized with different rates of organic fertilizers (poultry or farmyard manures) and minerals (NPK). Different growth parameters, chemical constituent and yield were determined in this study. The results indicated that organic fertilized plants achieved higher values of different growth parameters (plant height, number of branches, plant leaflets blade area and dry weight / plant) and yield and its components (number of pods / plant, no of seeds / pod, weight of seeds / pod, weight of 100 seeds and weight of seeds / plant). The best results were obtained when the plants were fertilized with high rate of poultry manure (8 tons) and NPK fertilizers (50 kg ammonium nitrate 33.5% + 200 kg superphosphate 15.5% + 50 kg potassium Sulphate 48%). The present results also show that the concentration of chlorophyll. A, b, carotenoids, crude proteins, total free amino acids, total carbohydrates, total sugars, reducing sugars and non soluble carbohydrates recorded the higher values in both leaves and seeds of those plants fertilized with either poultry or farmyard manures when compared with those fertilized with NPK. The present study clearly shows that the best effect was recorded by supplying the plants with poultry manure (8 tons + NPK nutrients (50 kg ammonium nitrate 33.5% + 200 kg superphosphate 15.5% + 50 kg potassium Sulphate 48%) .

Introduction

Broad bean (*Vicia faba* L.) is a famous winter leguminous crops in Iraq. It is considered as a good source of vegetarian protein for human consumption, and it is cultivated in crop rotations to improve soil properties [1]. Application of chemical and organic fertilizers is an essential process in plant management. Adequate fertilizers led to increase the crop yields, improves the nutrient element concentration in plant tissue and soil macro and micro nutrient status. Chemical fertilizers are expensive and have harmful effects on the environment [2], therefore recommended the addition of organic matter (animals manure) as an alternative to chemical fertilizers [3]. The addition of organic fertilizers efficiently ensures high production and continuous crops by improving soil properties and increase roots development and soil microorganism's activity [4&5]. Some researchers reported that application of organic manure (poultry or farmyard manure) increased pod yield, N, P, Ca, Mg, Zn and Cu concentration and their uptake plants [6,7,8,9,10,11,12,13,14&15].

Because of the importance effect of fertilizer types, especially organic fertilizers in influencing the quantity and quality of yield as well as external and physiological aspects of plant growth, this study was carried out to compare the effect of some organic fertilizers (poultry or farmyard manure) in combination with chemical fertilizers on growth, yield and chemical constituents of broad bean plants grown in the newly reclaimed soil.

Materials and Methods

The field experiment was carried out in a calcareous soil in the Farm in Demo, Fayoum, Governorate during two successive seasons 2017 / 2018 and 2018 / 2019. Soil properties of the experimental soil and chemical analysis of the studied organic fertilizers are shown in Table 1.

Two types of organic fertilizers i.e., poultry manure and farmyard manure were used at the rates of 4 and 8 tons / fed and added as pre-sowing application. The amount of mineral fertilizers were used at the rates of 0, 50 and 100 % from N, P, K from the rate recommended by the Egyptian Ministry of Agriculture (0.0, 25 and 50 kg / fed. of ammonium nitrate 33.5% N, 0.0, 100 and 200 kg / fed. calcium superphosphate 15.5 % P₂O₅ and 0.0, 25 and 50 kg / fed. potassium sulphate 48 % K₂O for broad bean plants respectively.

Table 1. The chemical properties of experimental soil and organic fertilizers

Analysis	Soil	Poultry	Farmyard
PH	7.86	7.30	8.15
Organic matter %	0.63	28.11	17.10
Total nitrogen %	0.36	1.51	0.92
Calcium carbonate %	12.01	5.80	6.00
EC, mmohs / cm	4.55	7.10	1.90
P %	0.040	0.16	0.26
K%	0.063	0.86	1.00
Fe ppm	4.36	8430.81	25790.0
Mn ppm	2.20	200.10	330.81
Zn ppm	0.31	777.95	82.87
Cu ppm	1.20	42.90	40.50

Broad bean seeds variety Giza 843, were obtained from Agricultural research center, Ministry of Agriculture, Egypt. Seeds of plants were sown on November 4th in the two seasons of 2017 / 2018 and 2018 / 2019. The experimental layout used was completely randomized block system. Each treatment replicated three times. Each replicate contained three units the experimental unit contained five ridges 3.5m in length and 0.6m width. The normal cultural practices for growing broad bean plants were applied.

Growth parameters:

Different growth parameters were determined at the age of 125 days, as follow, i.e. plant height (cm), number of main stem internodes / plant, area of the seven the leaf (leaflets blade) from the apex of plant (fully expanded leaf), using an area meter, model Li3000 from Li CORC, USA, number of branches / plant and dry weight of shoots (main stem + branch) / plant.

Yield and components:

At harvest stage (aged 150 days), number of pods / plant (main stem + branches), number and weight of seeds / plant, weight of 100 seeds (g) and weight of seed yield / plant (g) were determined.

Chemical analysis:

The following chemical constituents were determined in both two seasons in leaves and seeds.

- Plant pigments (Chlorophyll a, b and carotenoids) were extracted from fresh leaves and determined calorimetrically as µg / g fresh leaves according to the method described by[16] .
- Crude protein was calculated by N % X 6.25 in dry broad bean seeds.
- Total free amino acids were determined calorimetrically according to the method described by [17].
- Total carbohydrates were determined calorimetrically according to the method described by [18], total and reducing sugars were determined according to[19], non-soluble carbohydrates were obtained by subtracting total sugars from total carbohydrates and recorded as mg / g dry weight.
- Total soluble phenols were determined according to[20] .

- f- Total indoles were determined according to [21] .
- g- Minerals, total nitrogen % was determined, using the Orange G dye according to the methods described by [22], phosphorus % was determined according to [19], potassium % was determined according to [23] by flame photometer.

Statistical analysis:

Analysis of variance of in the two seasons was carried out by using randomly complete block design according to [24]. The differences between treatment means were compared by L.S.D test for significance at 0.05 level of probability.

Results and Discussion

1- Growth parameters:

Data presented in Table (2 & 3) show that, growth parameters of broad bean plant represented in plant height, number of internodes / main stem, number of branches / plant, leaf area and dry weight / plant were greatly improved by mineral fertilization in presence of organic fertilizers at different rates. The highest increases in growth parameters were observed in fertilized plants with highest the rates of mineral fertilizers (50 kg / fed. of ammonium nitrate 33.5% N, 200 kg/fed. calcium superphosphate 15.5% P₂O₅ and 50 kg/fed. potassium sulphate 48% K₂O for broad bean plants) and received, organic fertilizers, mainly poultry manure at its high amount (P₂ + 100). These increases recorded 115 and 140.54 % in plant height, 93.75 and 135.71 % in number of internodes / main stem, 250 and 200 % in number of branches / plant, 75.76 and 69.56 % in leaf area and 159.56, 147.46 % in dry weight / plant at the first and second seasons respectively in comparison to the unfertilized plants.

2- Yield and its components:

Results in Table (3 & 4) show that, mineral fertilizers in combination with organic fertilizers resulted in a great effect on yield and its components of broad bean plant. The beneficial effect of organic fertilizers was more pronounced with the highest level of mineral fertilizers in comparison to unfertilized plants during the two studied seasons. However, poultry manure in combination with mineral fertilizers was better than farmyard manure. Where, fertilized plant with the highest level of mineral fertilizers in presence of the highest amount of poultry manure was characterized by a greater yield and its components than the other treatments.

Table 2. Effect of different rates of organic and inorganic fertilizers on growth parameters of broad beans (*Vicia faba* L.) plants grown in

Treatments		Dry weight / plant (g)		Leaf area (cm ²)		No. of branches		No. of internodes	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019	2018	2019
Without organic manure	Control	4.55	4.53	42.5	45.0	1.00	1.25	16.0	14.0
	50 %	5.21	5.01	48.2	51.1	2.00	2.25	19.0	20.0
	100 %	7.58	7.85	69.4	72.0	2.50	2.50	28.0	25.0
Poultry manure 4tons/fed. P ₁	Zero	6.21	6.13	49.0	45.9	1.50	1.75	17.0	18.0
	50 %	8.92	8.33	58.9	59.5	1.75	2.00	20.0	22.0
	100 %	10.63	10.13	72.8	75.3	2.75	2.75	29.0	32.0
Poultry manure 8tons/fed. P ₂	Zero	6.85	6.81	51.0	48.2	2.00	1.75	19.0	18.0
	50 %	9.35	8.99	62.2	60.1	2.50	2.75	22.0	20.0
	100 %	11.81	11.21	74.7	76.3	3.50	3.75	31.0	33.0
Farmyard manure 4tons/fed. F ₁	Zero	5.95	5.75	46.1	49.7	1.75	1.50	16.5	18.0
	50 %	8.00	7.85	55.0	58.1	1.75	2.00	20.0	21.0
	100 %	10.21	9.98	71.8	73.2	2.25	2.25	28.0	25.0
Farmyard manure 8tons/fed. F ₂	Zero	6.52	6.12	52.0	55.8	1.75	2.00	18.0	20.0
	50 %	9.00	8.88	60.5	63.7	2.50	2.50	21.0	23.0
	100 %	11.33	11.03	72.3	70.9	3.00	3.25	29.0	31.0
L.S.D. 5%		0.07	0.20	0.21	0.37	0.75	0.75	1.25	0.58

At this treatment, number of pods / plant, number of seeds / pod, weight of seeds / pods, weight of seeds / plant and weight of 100 seeds were significantly increased by 356.25, 100.0, 271.43, 554.66 and 85.15 % in comparison to unfertilized plants at the first season. Similar trend was observed in the second season (Table 3&4). Also, farmyard manure in combination with mineral fertilizers, each at the highest level resulted in improving yield and its components but to a lesser extent in comparison to poultry manure.

Table 3. Effect of different rates of organic and inorganic fertilizers on growth parameters and yield and its components of broad beans (*Vicia faba* L.) plants grown in calcareous soil

Treatments		Plant height (cm)		Weight of yield / plant (g)		Weight of 100 seeds (g)		No. of seeds / pod	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019	2018	2019
Without organic manure	Control	40.0	37.0	15.00	20.15	50.51	48.12	2.50	2.75
	50 %	65.0	60.0	40.21	43.25	62.50	66.01	3.50	3.75
	100 %	89.5	93.0	49.62	53.14	70.81	72.11	3.75	3.75
Poultry manure 4tons/fed. P ₁	Zero	43.0	40.0	28.50	25.15	55.32	60.33	3.00	2.75
	50 %	68.0	71.0	58.50	66.12	69.95	70.11	4.00	4.25
	100 %	80.0	85.0	86.50	93.15	82.15	85.13	4.50	4.75
Poultry manure 8tons/fed. P ₂	Zero	48.0	43.0	30.21	35.22	66.20	65.01	3.50	3.25
	50 %	70.0	75.0	69.72	69.21	82.10	80.11	4.50	4.75
	100 %	86.0	89.0	98.20	95.22	93.52	95.00	5.00	5.25
Farmyard manure 4tons/fed. F ₁	Zero	42.0	40.0	23.70	25.33	55.00	51.00	3.00	2.75
	50 %	65.0	61.0	50.52	52.20	65.61	62.33	3.75	3.25
	100 %	72.0	69.0	80.00	86.11	80.00	82.24	4.00	3.75
Farmyard manure 8tons/fed. F ₂	Zero	46.0	47.0	28.12	32.14	62.75	64.11	3.25	3.50
	50 %	59.0	55.0	62.41	65.11	78.30	80.31	4.25	4.00
	100 %	84.0	81.0	90.22	93.64	90.02	92.21	5.00	5.25
L.S.D. 5%		4.64	3.60	0.21	0.57	0.81	0.98	1.09	1.11

3- Chemical constituents:**A- Pigments:**

Data recorded in Table (4&5) clearly show that, organic fertilizers had a stimulative effect on chemical constituents of broad bean plants specialty in combination with the highest rate of mineral fertilizers. Chemical constituents represented in chlorophyll a, b and carotenoids were gradually increased with increasing organic and mineral fertilizers amounts each alone or in combination together.

Table 4. Effect of different rates of organic and inorganic fertilizers on yield and its components and chemical constituents of broad beans (*Vicia faba* L.) leaves grown in calcareous soil

Treatments		No. of pods / plant		Weight of seeds / pod (g)		Chlorophyll A ug / g F.W		Chlorophyll B ug / g F.W	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019	2018	2019
Without organic manure	Control	4.00	4.25	1.26	1.32	570	580	500	511
	50 %	8.50	8.75	2.19	2.48	595	612	542	540
	100 %	11.50	12.00	2.66	2.70	635	633	600	589
Poultry manure 4tons/fed. P ₁	Zero	6.75	6.50	1.66	1.66	600	610	563	570
	50 %	10.50	10.75	2.80	2.98	648	655	603	621
	100 %	15.25	15.50	3.70	4.04	687	693	655	649
Poultry manure 8tons/fed. P ₂	Zero	8.00	7.75	2.32	2.11	652	660	608	619
	50 %	12.50	13.00	3.69	3.81	675	673	636	643
	100 %	18.25	17.75	4.68	4.99	722	740	677	675
Farmyard manure 4tons/fed. F ₁	Zero	6.50	6.00	1.65	1.53	581	602	538	535
	50 %	10.00	10.25	2.46	2.03	621	634	581	592
	100 %	14.25	13.75	3.20	3.08	664	671	610	628
Farmyard manure 8tons/fed. F ₂	Zero	7.50	8.00	3.04	2.24	600	613	559	566
	50 %	11.00	10.75	3.33	3.21	655	663	617	600
	100 %	16.00	15.50	4.50	4.84	695	711	659	668
L.S.D. 5%		1.36	1.84	0.19	0.23	6.16	5.68	20.67	13.23

The best results were attained with the highest rate of poultry manure (8tons/fed) in combination with the highest rate of NPK fertilizers, followed by farmyard manure at its high amount in combination with mineral fertilizers. This trend was similar during the two studied seasons.

B- Crude protein and total free amino acids concentrations:

Data recorded in Table (5) show that, organic fertilizers had a stimulative effect on chemical constituents of broad bean plants specialty in combination with the highest rate of mineral fertilizers. Chemical constituents represented in crude proteins and total free amino acids concentrations were gradually increased with increasing organic and mineral fertilizers amounts each alone or in combination to gather. The best results were attained with the highest rate of poultry manure in combination with the highest rate of mineral fertilizers, followed by farmyard manure at its high amount in combination with mineral fertilizers. This trend was similar during the two studied seasons. The effect of organic fertilizers was more pronounced on free amino acid concentrations than the other chemical constituents. Where, the highest rates of poultry manure in combination with the highest rate of mineral fertilizers caused maximum increase of free amino acids concentration at the first season (301.79 % and 43.73%) and the second one (248.46 % and 43.81%) for leaves and seeds respectively in comparison to the control (Table, 5).

C- Total phenols:

Data recorded in Table (5) show that total phenols of both leaves and seeds were greatly affected by the different kinds and amounts of the both two organic fertilizers either alone or in combination with NPK fertilizers. Increasing the rate of NPK fertilizers significantly decreased total phenols of leaves and seeds but to a lesser extent in comparison to organic fertilizer. The kinds of organic fertilizer (poultry manure and farmyard manure) gave the best results especially poultry manure at its maximum rate in combination with NPK fertilizers. Leaves and seeds of broad bean plants fertilized by poultry manure contained lower total phenols concentrations than the other treatments. Moreover, increasing poultry manure rate caused a high decrease in total phenols counteractions of leaves and seed.

Table 5. Effect of different rates of organic and inorganic fertilizers on chemical constituents of broad beans (*Vicia faba* L.) leaves grown in calcareous soil

Treatments		Carotienoids ug / g F.W		Crude protein %		Total amino acids mg / g D.W		Total phenols mg / g D.W	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019	2018	2019
Without organic manure	Control	41.50	39.15	15.63	15.06	4.46	5.18	12.44	13.21
	50 %	45.60	47.25	18.44	18.69	6.12	6.99	10.45	11.05
	100 %	52.80	56.90	20.00	19.69	8.96	9.12	7.47	7.63
Poultry manure 4tons/fed. P ₁	Zero	48.50	50.13	17.56	17.38	5.97	6.21	11.31	12.05
	50 %	55.60	58.66	18.50	19.19	8.82	9.03	8.52	9.29
	100 %	69.80	73.7	23.06	23.49	10.45	11.01	7.00	6.99
Poultry manure 8tons/fed. P ₂	Zero	54.60	58.12	18.75	18.69	7.13	8.01	9.85	10.33
	50 %	60.20	66.11	21.38	21.44	12.44	11.99	7.16	8.33
	100 %	79.00	78.25	24.06	23.69	17.92	18.05	5.42	6.25
Farmyard manure 4tons/fed. F ₁	Zero	45.20	48.22	16.88	16.63	5.53	6.33	9.50	9.83
	50 %	51.60	55.55	18.50	18.69	8.00	8.31	7.86	6.89
	100 %	62.40	67.11	22.19	22.50	9.51	9.45	7.28	6.38
Farmyard manure 8tons/fed. F ₂	Zero	50.10	53.10	18.13	18.06	6.50	6.99	9.12	8.96
	50 %	57.30	60.12	20.69	21.31	10.38	11.08	7.00	6.13
	100 %	78.10	75.21	23.13	23.63	14.92	15.63	6.38	5.88
L.S.D. 5%		6.27	2.54	0.68	0.75	0.28	0.39	1.04	0.31

D-Carbohydrates:

Data recorded in Table (6, 7&8) Cleary show that, as expected, organic fertilizers had a positive effect on the chemical constituents of broad bean leaves and seeds either alone or in combination with mineral fertilizers. The trend at the first season resembles that at the second one. Among the organic fertilizer types and their amount, variation in mentioned chemical constituents was observed. In this respect, poultry organic fertilizer gave the best results either alone or in combination with mineral fertilizer in comparison to farmyard organic fertilizer under the same conditions. Where, the highest increase of the chemical constituents mentioned previously were

obtained by using the highest rate of poultry manure in combination with the highest rate of mineral fertilizers followed by farmyard manure under the same conditions. At the first season, these increments over control recorded (83.37, 67.57 % for total carbohydrates; 107.79, 84.66 % for total sugar; 138.52, 113.77 % for reducing sugar; 73.28, 60.52 % for non-soluble carbohydrates concentrations) for leaves and (83.37, 67.57% for total carbohydrates, 107.79, 84.66% for total sugars, 138.52, 113.77% for reducing sugars and 73.28, 60.52% for non-soluble carbohydrates concentration) for seeds at P₂ and F₂ treatments, respectively each in combination with mineral fertilizers at the highest rate (100 %). On the other hand total phenols concentration was decreased by 56.43 and 48.71% at P₂ and F₂, respectively each in combination with mineral fertilizers similar trend was obtained at the second season (Table 5). It is clear from the results in Table (5, 6, 7, 8 & 9) that chemical constituent of leaves and seeds of broad bean plants were improved greatly under organic fertilizer conditions especially poultry manure.

Table 6. Effect of different rates of organic and inorganic fertilizers on chemical constituents of broad beans (*Vicia faba* L.) leaves grown in calcareous soil

Treatments		Total sugars mg / g D.W		Reducing sugars mg / g D.W		Non soluble carbohydrates mg / g D.W		Total carbohydrates mg / g D.W	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019	2018	2019
Without organic manure	Control	28.49	25.44	18.95	16.33	69.02	86.11	97.51	111.55
	50 %	32.65	33.55	24.44	25.22	103.55	99.60	136.2	133.15
	100 %	40.81	44.11	33.18	31.11	116.59	115.01	157.4	159.12
Poultry manure 4tons/fed. P ₁	Zero	38.50	39.90	23.71	26.13	78.10	81.11	116.6	121.00
	50 %	46.71	48.13	30.38	31.18	93.49	91.86	140.2	139.99
	100 %	50.55	50.16	40.51	44.17	117.55	108.99	168.1	159.15
Poultry manure 8tons/fed. P ₂	Zero	40.00	43.12	29.23	28.35	88.00	88.02	128.0	131.14
	50 %	49.51	49.14	39.61	41.14	99.20	106.11	148.2	155.25
	100 %	59.20	56.20	45.20	45.13	119.60	116.94	178.8	173.14
Farmyard manure 4tons/fed. F ₁	Zero	35.00	36.11	22.19	23.18	75.20	83.20	110.2	119.31
	50 %	42.10	43.12	27.20	26.14	88.50	93.41	130.6	136.53
	100 %	46.22	48.33	36.35	38.33	109.38	110.88	155.6	159.21
Farmyard manure 8tons/fed. F ₂	Zero	38.21	37.11	25.51	29.14	82.49	91.01	120.7	128.12
	50 %	44.50	45.17	31.18	33.15	93.80	92.02	138.3	137.19
	100 %	52.61	54.17	40.51	41.14	110.79	111.08	163.4	165.25
L.S.D. 5%		1.51	1.48	0.87	1.40	2.03	1.65	1.72	1.73

E-Total indoles:

Data in both two seasons presented in Table (8) indicate that, leaves of bread bean plant contained a high concentration of total indoles under organic fertilizers conditions comparing to unfertilized plants. Moreover, the total indoles were significantly increased with increasing organic fertilizer rate. Similar results were obtained with increasing NPK fertilizer amounts but to a lesser extent. The combination between organic and NPK fertilizers gave the best results, especially poultry manure. Maximum increase was observed in total indole concentration (35.15 and 31.68 %) at P₂ and F₂ treatments, each in combination with the highest rate (100 %) of NPK fertilizers.

Table 7. Effect of different rates of organic and inorganic fertilizers on chemical constituents of broad beans (*Vicia faba* L.) seeds grown in calcareous soil

Treatments		Crude protein %		Total free amino acids mg / g D.W		Total soluble carbohydrates mg / g D.W	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019
Without organic manure	Control	25.50	23.13	30.76	30.13	172.05	165.30
	50 %	25.50	25.15	28.51	29.21	175.21	170.10
	100 %	25.69	26.01	26.42	25.33	178.70	180.13
Poultry manure 4tons/fed. P ₁	Zero	26.13	26.93	24.81	23.19	177.31	180.20
	50 %	26.56	26.99	23.00	23.05	180.20	181.20
	100 %	27.69	28.01	21.15	22.13	182.60	186.30
Poultry manure 8tons/fed. P ₂	Zero	26.75	26.92	20.75	21.25	178.65	182.14
	50 %	28.13	28.83	19.28	19.99	181.22	185.25
	100 %	29.50	29.00	17.31	16.93	184.52	185.65
Farmyard manure 4tons/fed. F ₁	Zero	25.31	25.69	28.22	29.39	174.51	169.21
	50 %	25.75	25.99	27.05	26.13	176.77	174.33
	100 %	26.38	27.00	25.16	23.21	179.50	183.25
Farmyard manure 8tons/fed. F ₂	Zero	25.88	24.99	26.71	26.11	176.40	171.33
	50 %	26.56	27.01	25.00	24.11	179.00	183.20
	100 %	27.19	27.25	23.24	22.21	183.61	185.17
L.S.D. 5%		1.08	2.01	1.35	2.41	3.15	4.70

Table 8. Effect of different rates of organic and inorganic fertilizers on chemical constituents of broad beans (*Vicia faba* L.) seeds and leaves grown in calcareous soil

Treatments		Seeds				Leaves	
		Total sugars mg / g D.W		Totalphenols mg / g D.W		Total indoles mg / g F.W.	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019
Without organic manure	Control	43.21	44.25	1.95	1.90	2.02	1.93
	50 %	35.32	34.13	1.58	1.59	2.23	2.25
	100 %	30.05	29.21	1.50	1.45	2.46	2.43
Poultry manure 4tons/fed. P ₁	Zero	39.61	40.91	1.31	1.33	2.19	2.10
	50 %	35.00	36.11	1.22	1.20	2.46	2.45
	100 %	32.61	33.00	1.20	1.19	2.56	2.59
Poultry manure 8tons/fed. P ₂	Zero	37.44	38.13	1.25	1.27	2.50	2.53
	50 %	33.52	32.12	1.15	1.19	2.66	2.65
	100 %	30.00	29.06	1.05	1.10	2.73	2.79
Farmyard manure 4tons/fed. F ₁	Zero	38.41	40.55	1.78	1.69	2.17	2.11
	50 %	33.51	31.11	1.55	1.49	2.43	2.40
	100 %	31.62	30.95	1.45	1.39	2.49	2.45
Farmyard manure 8tons/fed. F ₂	Zero	36.50	38.00	1.59	1.54	2.41	2.42
	50 %	33.41	32.18	1.38	1.32	2.51	2.59
	100 %	30.00	28.12	1.30	1.31	2.66	2.71
L.S.D. 5%		1.77	3.12	0.14	0.18	0.16	0.12

E. Nitrogen, phosphorus and potassium concentrations:

Data in both two seasons presented in Table (9) indicate that, leaves of bread bean plant contained a high concentration of nitrogen, phosphorus and potassium under organic fertilizers conditions comparing to unfertilized plants. Moreover, the present chemical constituents were significantly increased with increasing organic fertilizer rates. Similar results were obtained with increasing NPK fertilizer amounts but to a lesser extent. The combination between organic and mineral fertilizers gave the best results, especially poultry manure. Maximum increase was observed in phosphorus concentration (66.67 and 50.0 %) followed by nitrogen concentration (57.26 and 56.85 %), at P₂ and F₂ treatments, each in combination with the highest rate (100 %) of NPK fertilizers. The present results show that, increasing chemical constituents represented in, nitrogen, phosphorus and potassium concentrations due to the combination of NPK and organic fertilization.

Table 9. Effect of different rates of organic and inorganic fertilizers on chemical constituents of broad beans (*Vicia faba* L.) leaves grown in calcareous soil

Treatments		Nitrogen %		Phosphorus %		Potassium %	
Organic fertilizer	Mineral fertilizer	2018	2019	2018	2019	2018	2019
Without organic manure	Control	2.50	2.41	0.18	0.16	2.20	2.15
	50 %	2.95	2.99	0.21	0.22	2.31	2.32
	100 %	3.20	3.15	0.23	0.25	2.42	2.39
Poultry manure 4tons/fed. P ₁	Zero	2.84	2.78	0.22	0.22	2.32	2.31
	50 %	2.99	3.07	0.25	0.24	2.45	2.45
	100 %	3.69	3.75	0.27	0.28	2.49	2.46
Poultry manure 8tons/fed. P ₂	Zero	3.00	2.99	0.24	0.25	2.35	2.34
	50 %	3.42	3.43	0.28	0.27	2.49	2.50
	100 %	3.85	2.79	0.30	0.31	2.55	2.53
Farmyard manure 4tons/fed. F ₁	Zero	2.70	2.66	0.21	0.22	2.30	2.28
	50 %	2.96	2.99	0.23	0.24	2.42	2.43
	100 %	3.55	3.60	0.24	0.24	2.46	2.48
Farmyard manure 8tons/fed. F ₂	Zero	2.90	2.89	0.23	0.22	2.33	2.31
	50 %	3.31	3.41	0.24	0.25	2.40	2.42
	100 %	3.70	3.78	0.27	0.29	2.49	2.51
L.S.D. 5%		0.12	0.09	0.01	0.01	0.09	0.05

Discussion

Fertilizing the plants with organic manures (poultry or farmyard) combined with some mineral nutrients (NPK) resulted in vigorous growth as well as highly productivity of seeds with good quality. An increasing the measured growth characters (plant height etc...) was due to that these fertilizers resulting in more release of available nutrients (micro or macro ones) to be absorbed by the tested plants[14&25].The important role of N in protein, chlorophyll, enzymes and energy transfer substances (ADP and ATP) were early recorded by[26].The results showed highly concentrations of chemical constituents estimated both leaves and seeds of the above mentioned fertilized plants. This finding could be an indication to the high rate of synthesis of these products as indication to the role of organic matter in supplied the plants with nutrient-sufficient, which increases the vegetative parts and thus increase various growth processes such as chlorophyll formation, photosynthesis process as well as the utilization of carbohydrates in the, which utilized in the 219 composition of plant parts and thus decrease of competition and abortion, which led to the increase in the number of seeds per pod, this is consistent with [27]) on common bean and [28] on soya bean. The hormonal balance between the promoters and inhibitors which regulate the different physiological processes in the plants appear to be highly affected by the nutrient status of the plants. These results are in full agreement with those obtained by[29] on brood bean and wheat plants. The above mentioned results lead us to propose that the supplying plants with the organic manures in addition to some major nutrients (N,P,K) lead to high yield of seeds with a good quality. Moreover, organic matter that contains most of the nutrients leads to increase the amount of protein and carbohydrates accumulated in the seed which leads to increase the weight of the seed [30].Also,

the increase in protein by chemical fertilization (NPK) is attributed to the role of N and P in the plant [31&32]. The increase of protein by applying poultry or farmyard manure is attributed to its contain of amino acids and vitamins and many of the elements [33]. This was consistent with [34]. The reason for increasing protein concentration when adding organic fertilizers is due to the high concentration of nutrient elements which is easy to absorb by the plant and conversion to useful substances such as the converts the nitrogen to protein in the plant, which accumulates in the seeds during maturation [26]. The increase in the seed number per pod by chemical fertilizer (NPK) was attributable to the role of phosphorus in increasing the activity and growth of plant roots as well as increasing plant vegetative growth, and to the phosphorus entry in most vehicles energy-rich which is necessary in plant biosynthesis [35]. This was consistent with [36] in broad bean.

Conclusion

It is clear from the present study that improving growth and yield of broad bean plants grown in newly cultivated land were required fertilized with different rates of organic fertilizers (poultry or farmyard manures) with minerals fertilizers (NPK). The data also show that organic fertilized plants achieved higher values of different growth parameters and chemical constituents of leaves and seeds such as chlorophyll. A, b, carotenoids, crude proteins, total free amino acids, total carbohydrates, total sugars, reducing sugars and non soluble carbohydrates. The highest results were obtained when the plants were fertilized with high rate of poultry manure (8 tons) and NPK fertilizers (50 kg ammonium nitrate 33.5% + 200 kg superphosphate 15.5% + 50 kg potassium Sulphate 48%).

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