International Journal of Botany Studies
ISSN: 2455-541X; Impact Factor: RJIF 5.12
Received: 10-09-2019; Accepted: 12-11-2019
www.botanyjournals.com
Volume 4; Issue 6; September 2019; Page No. 57-61

A study of Bacterial Pollen *Azotobacter chroococcum*, *Psudomonas putide* and Organic Compost in *Cucurbita pepo* L. growth

Amar H Madhi[1*], Jawad Abd Al-Kadhim[2]
[1-2] department of Soil and Water Resources, AL-Qadisiya University, Agriculture Collage, Iraq

Abstract
A laboratory experiment is carried out in one of the greenhouses of the Faculty of Agriculture - Al Qadisiya University during the autumn season 2018-2019 and three replicates using RCBD design. The mean of the treatments is compared with the least significant difference of LSD at the 5% probability level in the Sandy loom soil to study the effect of A. bacterium *Azotobacter chroococcum* and *Psudomonas putide* and four levels of compost 0, 1, 2, 3 tons 1 hectare in the growth of *Cucurbita pepo* L plant.
The study shows that the best results are in the treatments that combined the bio-fertilization with the mixture and organic fertilizer at the level of adding 3 tons. Ha, in the traits of plant length, leaf area and dry weight of root and vegetable total, which were 97.11, 14200, 7.470 and 208.33 respectively, compared to the rest of the treatments. The treatment followed by the dual fertilizer *Azotobacter chroococcum* and *Psudomonas putide* increased significantly Plant, leave area and dry weight of the root and vegetative mass, because they give the best results in terms of length of plant, leave area and dry weight of the root and vegetable total, which reached 96.48, 13925, 7.093, 190.99, respectively, compared to the comparison treatment.

Keywords: *Cucurbita pepo* L, *A. chroococcum*, *P. putide*, organic compost

Introduction
Cucurbita pepo L is one of the most important vegetable crops belonging to the Cucubitaceae family. South America is the original home of its native inhabitants for more than 2000 years. It spreads throughout the world and is one of the most common vegetable crops in the Arab world, Iraq (2002, Dilson) [15]. In the country, the pumpkin is grown in the open fields with the first spring seeds starting in March to produce its production in April and the second autumn in the second half of August to produce its production in October and the second. In recent years, farmers have tended to plant them in winter houses, In Iraq for the year 2012 more than 148 thousand hectares at a rate of 15.472 tons / ha (Central Statistical Organization, 2012).
Use of organic fertilizers helps to protect soil health, extend sustainable and economical production of potato, produce sufficient quantities of safe and nutritious food, maintain viable farming enterprises and contribute (AL-Taey, *et al*, a 2018; Burhan and AL-Taey, 2018; Manea, *et al*, 2019) [5, 6]
Bio-fertilizer is natural substance which is composed of many strains of bacteria and fungus for decreasing the chemical fertilizers in fertilization applications. In addition, bio-fertilizer has a positive role in helping the plants (AL-Taey and Majid, 2018a, AL-Taey *et al*., 2019) [5, 8].
The results of the Sarhan *et al*. (2011) [22] study show a significant increase in plant height and number of dry leaves and weight in the treatment of pumpkin plant with Azotobacter compared to comparison treatment. The results of Mahfouz and Sharaf-Eldin (2007) [17] showed a significant increase in plant height and dry weight of plant root and plant mass when treated with Pseudomonas for pumpkin plant compared with comparison treatment, (AL-Taey and Majid, b 2018) [5] achieved a highest values in growth and yield when they mixed the bio fertilizers with organic compost.
Most of the studies conducted by the researchers indicate that the process of mixed organic and organic fertilization caused an increase in the growth characteristics of the plant. The results of the study conducted by Habibi *et al*. (2011) [16] show that the highest values of dry weight of pumpkin plant were obtained when compost was treated with 10 tons. 1, with germination of nitrogen-soluble and phosphorus-containing bacteria compared to all treatments, The results of Mahfouz and Sharaf-Eldin (2007) [17] show a significant increase in plant height and dry weight of the root and vegetative mass of the plant when adding Azotobacter and Psudomonas to the pumpkin plant compared with other treatments. Al-Jader, (2016) [2] finds in a study of cucumber plants that the length of the plant, the leave area and the dry weight of the root and vegetable total increased significantly when fertilizing with bio fertilizers and compost with a level of 20 tons Ha -1 compared to other treatments. The study of Morocco (2015) shows a significant increase in the leave area and dry weight of the pumpkin plant when fertilizing with organic fertilizer, especially at the level of addition of 40 tons Ha-1.

Materials and Methods of Work
The experiment was carried out in one of the greenhouses of the Faculty of Agriculture - Al-Qadisiya University in the autumn season 2018 and 2019 with an area of 225 m 2 (9 × 25) m in Sandy loom soil to study the effect of addition of compost and bio-fertilizer in the growth of Ghasala F1 gourd plant. And then random samples are taken from the soil of the plastic house and in depth (0-30 cm) to determine some physical and chemical soil properties before the experiment was started.

Table 1: Physical and chemical proprieties of the soil

Character	Value	Unit
Clay	110	g kg soil^{-1}
Loam	291	
Sand	599	
Soil texture Sandy loom		
Bulk density	1.37	g.cm-^{3}
EC	2.16	Ds.cm m^{-1}
pH degree	7.4	----
CEC	19.32	Cnt. ml. kg soil^{-1}
O.M	1.7	g.kg.soil^{-1}
N	26.4	mg.kg.soil^{-1}
P	7.3	
K	158	

The soil is then softened and well milled, divided into three sections along the length of the plastic house between each floor and the other 1mt isolation distance. The single mound is divided into 16 experimental units. Drip irrigation systems were installed along each mooring. Surface gourd seeds are sterilized using mercury chloride and alcohol and then washed with distilled water Sterilizer to remove trace material. The seeds are then gummed with 1:10 g of gum: 1 ml of distilled water for half an hour to ensure that the bacteria adhere to the seeds while cultivating non-vaccinated seeds first.

Pumpkin seeds are planted directly in the field on 20/9/2018 on both sides of the substrate by making a gourd at a distance of 40 cm between Joura and others (Al-Obeidi, 1986). After 15 days of germination one plant is left in Al-Joura. The experiment includes four levels of compost (0, 1, 2, 3) and two levels of the bio-adhesive A. chroococcum and P. putide. Thus, the experiment includes 48 laboratory treatments, which are organized in a randomized, Repeat and compare the mean of the transactions with the least significant differences of LSD at the level of 5%. Measure the volume distribution of soil minutes by (Black, 1965) [12]. The apparent density was estimated by (Black, 1965b) [12]. The electrical conductivity was estimated by the method described in (A.Page, *et al*., 1982). The pH and cation exchange capacity were calculated according to the method described in (Black, 1965) [12]. Organic matter is estimated according to the method described in (Black, 1965b) [12]. Nitrogen prepared by Caldal and phosphorus is prepared by the potassium and potassium system, which is equipped with the film and according to the method described in (Black, 1965a) [12].

Study Indicators

The vegetative growth characteristics is measured by taking five plants randomly from each experimental unit

1. Plant length (cm)

The measurement was carried out at the end of the experiment starting from the soil contact area to the end of the developing summit by the metric tape

2. Leave area (cm^2 – plant^{-1})

The leave area of the plant was measured on the basis of soft weight and according to the following equation Total area of papers (cm^2) = total weight of connectors / disk weight × Area of the circuit of the disks.

3. Dry weight of the root mass (gm^{-1})

Measure at the end of the experiment by taking five plants from the experimental unit randomly with the root total and taking the root total and wash well with water and leave to dry and then put in the oven at a temperature of 65 m 0 until the stability of weight.

4. Dry weight of the total vegetative (Gn^{-1})

The dry weight was measured at the end of the season by taking 5 plants from the experimental unit randomly, as the fruits and roots were removed, then weighed before drying and dried at 70 ° C for 48 hours until the weight was confirmed and dry weight was taken (Sahaf, 1989) [4]. Results and discussion.

Results and Discussion

Effect of addition of bacterial pollen *A. chroococcum*, *P. putide* and Compost fertilizer in plant length (cm).

The results of Table (2) show that the addition of the *A. chroococcum*, *P. putide*, Compost, and the double supplementation (*A. chroococcum* + *P. putide*), *A. chroococcum* + Compost and *P. putide* + Compost and triangular interference resulted in a significant increase in plant length compared to the treatment of the comparison. The treatment with the addition of the compost (*A. chroococcum* + *P. putide*) and the compost fertilizer at 3 ton per hectare exceeded the other treatments with an average of 97.11 (cm). Followed by the treatment of biomass additive compared to the control treatment with an average of 96.48 (cm). This increase may be attributed to the efficacy of mixed vaccine in providing the nitrogen and phosphorus more readily to the plant, which improves plant growth and functional performance (Bakulin *et al*., 2007) [11].

Table 2: Effect of bacterial pollination *A. chroococcum*, *P. putide* and compost fertilizer in plant length (cm).

***A. chroococcum* A1**	***P. putide* A2**	**Compost fertilizr level P**				**Averag**	
		P0	**P1**	**P2**	**P3**	**A3**	**A1**
A0	A0	75.61	78.43	80.04	80.30	78.60	83.72
	A2	80.91	91.03	91.52	91.89	88.84	
A1	A0	89.12	92.76	93.32	93.97	92.30	94.39
	A2	96.03	96.24	96.55	97.11	96.48	
L.S.D	4.393					2.197	1.553
A1*P							
A0		78.26	84.73	85.78	86.10	L.S.D A1*P=3.106	
A1		92.58	94.50	94.94	95.54		
A2*P						Averag A2	
A0		82.37	85.60	86.68	87.14	85.45	
A2		88.47	93.63	94.04	94.50	92.66	
		L.S.D A2*P = 3.106				L.S.D A2=1.553	
Averag P		85.42	89.62	90.36	90.82	L.S.D P =2.197	

P= Compost A0= without vaccination

A1=*A. chroococcum* A2=*P. putide* A3=*A. chroococcum*+ *P. putide*

2. Effect of addition of bacterial pollen *A. chroococcum*, *P. putide* and Compost fertilizer in leave area (cm^2)

The results of the statistical analysis in Table (3) show that the addition of the bacterial vaccine and organic fertilizer individually or double or triple interference, resulted in significant differences in the leave area compared to the comparison treatment. The treatment with the addition of the double *A. chroococcum* + *P. putide* was increased with compost fertilizer at a level of 3 tons^{-1} Compost

significantly in the leaf area of the plant on all the treatments with an average of 14200 (cm^2) followed by the addition of the mixture (*A. chroococcum + P. putide*) compared to the comparison treatment and an average of 13925 (cm^2), and the reason for this increase is the ability of these organisms to stabilize air nitrogen free, which works on the processing of the nitrogen element of the plant and the production of growth hormones of these neighborhoods, which have a significant impact on the division of cells and increase the expansion of the paper in addition to the increase in nitrogen work to increase the concentration of chlorophyll in Leaves and then increase photosynthesis which positively reflects the leave area of the plant (Valadabadi *et al*., 2011) [24].

Table 3: Effect of *A. chroococcum*, *P. putide* and compost in the leave area (cm^2).

***A. Chroococcum* A1**	***P. putide* A2**	**Compost fertilizr level P**				**Averag**	
		P0	**P1**	**P2**	**P3**	**A3**	**A1**
A0	A0	8900	10800	11700	11900	10825	11625
	A2	12100	12400	12500	12700	12425	
A1	A0	1300	13200	13300	13500	13250	13588
	A2	13700	13800	14000	14200	13925	
L.S.D	869.6					434.8	307.4
A1*P							
A0		10500	11600	12100	12300	L.S.D A1*P= 614.9	
A1		13350	13500	13650	13850		
A2*P						Averag A2	
A0		10950	12000	12500	12700	12038	
A2		12900	13100	13250	13450	13175	
		L.S.D A2*P = 614.9				L.S.D A2=307.4	
Averag P		11925	12550	12875	13075	L.S.D P = 434.8	

A0= without vaccination, P=Compost, A1=A. chroococcum, A2=P. putide A3=A. chroococcum+P. putide

3. Effect of adding A. chroococcum, P. putide and Compost in the dry weight of the root mass (Gn^{-1}).

The results of the statistical analysis in Table (4) indicate that the addition of the bacterial vaccine and the individual or double fertilization or triangular interference resulted in significant differences in the dry weight of the root mass compared to the comparison treatment. The addition of *A. chroococcum + P. putide* is higher with compost and at 3 (ton. Ha^{-1})is significantly composted in the dry weight of the root total of the plant on all the treatments and an average of 7.470 (g. $plant^{-1}$), followed by the treatment of the addition of the double vaccine (*A. chroococcum + P. putide*) compared with the comparison treatment and an average of 7.093 (g. $Plant^{-1}$).The reason may be attributed to the fact that bio-fertilization increases the slow release of nutrients, which reduces the amount lost by washing, especially nitrogen, and increases the efficiency of nutrient use (Muneshwar *et al*., 2001) [20].

Table 4: Effect of adding *A. chroococcum*, *P. putide* and compost in the dry weight of the root total (Gn^{-1})

***A. chroococcum* A1**	***P. putide* A2**	**Compost fertilizr level P**				**Averag**	
		P0	**P1**	**P2**	**P3**	**A3**	**A1**
A0	A0	4.923	5.310	5.410	5.640	5.321	5.650
	A2	5.810	5.970	6.010	6.130	5.980	
A1	A0	6.330	6.460	6.490	6.710	6.498	6.795
	A2	6.880	6.930	7.090	7.470	7.090	
L.S.D	0.2198					0.1099	0.0777
A1*P							
A0		5.367	5.640	5.710	5.885	L.S.D A1*P=0.1554	
A1		6.605	6.695	6.790	7.090		
A2*P						Averag A2	
A0		5.627	5.885	5.950	6.175	5.909	
A2		6.345	6.450	6.550	6.800	6.536	
		L.S.D A2*P = 0.1554				L.S.D A2=0.0777	
Averag P		5.986	6.168	6.250	6.488	L.S.D P =0.1099	

A0= without vaccination, P=Compost, A1=*A. chroococcum*, A2= *P. putide* A3=*A. chroococcum+P. putide*

4-Effect of adding *A. chroococcum*, *P. putide* and Compost in the dry weight of the vegetative group (Gn^{-1}).

The results of the statistical analysis in Table (5) show that the addition of the bacterial vaccine and the individual or double fertilization or triple interference resulted in significant differences in the dry weight of the vegetative group compared to the comparison treatment. The treatment with the addition of *A. chroococcum + P. putide* and compost fertilizer at the level of adding 3 tons was exceeded. Ha^{-1} was significant in the dry weight of the vegetative total of the plant on all the plants, with an average of 208.33 (g.$plant^{-1}$) followed by the addition of *A. chroococcum + P. putide* compared to the comparison treatment with an average of 190.99 (g.$Plant^{-1}$).

This is attributed to the positive interaction between azotobacter and sodomonas bacteria in the secretion of growth regulators that increase plant growth (Zuhairi, 2017).

Table 5: Effect of adding A. chroococcum, P. putide and Compost in the dry weight of the vegetative group (Gn^{-1}).

***A. chroococcum* A1**	***P. putide* A2**	**Compost fertilizr level P**				**Averag**	
		P0	**P1**	**P2**	**P3**	**A3**	**A1**
A0	A0	106.21	106.82	106.97	117.19	109.30	121.69
	A2	127.43	134.17	136.24	138.52	134.09	
A1	A0	143.08	145.31	148.62	153.12	147.53	169.26
	A2	171.59	186.74	197.29	208.33	190.99	
L.S.D	3.971					1.986	1.404
A1*P							
A0		116.82	120.49	121.60	127.85	L.S.D A1*P= 2.808	
A1		157.33	166.02	172.95	180.72		
A2*P						Averag A2	
A0		124.64	126.06	127.79	135.15	128.41	
A2		149.51	160.45	166.76	173.42	162.54	
		L.S.D A2*P = 2.808				L.S.D A2=1.404	
Averag P		137.08	143.26	147.28	154.29	L.S.D P = 1.986	

Without vaccination=A0 P=Compost A1=*A. chroococcum* A2=*P. putide* A3=*A. chroococcum*+ *P. putide*

From these results, the double addition of *A. chroococcum* + *P. putide* with compost achieved the highest values in plant length, leave area and dry weight of root and vegetable total compared to other treatments.

References

1. Al-aubaidy, Authman Khalid Alwan. Effect of nitrogen fertilization leael and cultivation spacing an groth and production of zucchini *Cucurbita pepo L*. Republic of Iraq, Dissertation College of Agriculture and forestry, University of Musul, 1986.
2. Aljader, Buthaina Mahemmed Sadiq. Effect of local isolates of bacteria stimulated for plant growth and Fertilieation by Compost to grow cucumber up, thesis, College of agriculture, university of Baghdad, 2016.
3. Almaghriby Najeeb, Muhemmed Husein. Effects of organic fertilize for soil and plant to qualitative charaeteristics and mineral Content of Zucchini, Alexandrid Science Exchange Journal. 2015; 36(2):245-257.
4. Alsahaf Fadhil Husein. Applied plant nutrition, Daar Alhikmah for printing, ministry of Higher education and Scientitic research, University of Baghdad, Iraq, 1989.
5. Al-Taey DKA, Majid ZZ. a. Study Effect of Kinetin, Bio-fertilizers and Organic Matter Application in Lettuce under Salt Stress. Journal of Global Pharma Technology. 2018; 10(1):148-164
6. Al-Taey DKA, Majid ZZ. b. The activity of antioxidants Enzymes and NPK Contents as affected by water qaulity, kinetin, bio and organic fertilization in lettuce (Lactuca sativa L.). Iraqi Journal of Agricultural Sciences. 2018; 49(3):506-518
7. Al-Taey DKA, Mijwel AK, Al-Azawy SS. Study efficiency of poultry litter and kinetin in reduced effects of saline water in Vicia faba. Research J Pharm. and Tech. 2018; 11(1):294-300.
8. AL-Taey DKA, MJH Al-Shareefi, AK MijweL, Al-Tawaha AR, Al-Tawaha AM. The beneficial effects of bio-fertilizers combinations and humic acid. Bulgarian Journal of Agricultural Science, 2019; 25(5).
9. Alzeharry RW Muhmood. Effect of enriched bio – fertilization and spaying by plant extracts on growth and crops of cucumber, Euphrates journal of agricultural Science. 2017; 9(2):46-56.
10. Annual Statistical group of Iraq. Ministry of planning, Iraq, 2012.
11. Bakulin MK, Grudtsyna AS, Pletneva AY. Biological fixation of nitrogen and growth of bacteria of the Genus *Azotobacter* in liquid media in the presence of perfluorocarbons, Applied Biochemistry and Microbiology. 2007; 43(4):399-402.
12. Black CA. Methods of soil Analysis part (2). Chemical and Microbiological Properties. Am. Soc. Agron. INC. Publisher, Madison, Wisconsin, U.S.A, 1965.
13. Black CA. a. Methods of Soil Analysis. Part 2. Chemical and microbiological properties Am. Soc. Agron., Inc. Madison Wisconson, USA, 1965.
14. Burhan AK, AL-Taey DKA. Effect of Potassium humate, humic acid, and compost of rice wastes in the growth and yield of two cultivars of Dill under salt stress conditions. Advances in Natural and Applied Sciences. 2018; 12(11):1-6
15. Dilson AB. Origin and evolution of cultivated cucurbita. Ciencia Rural. 2002; 32(5):715-723.
16. Habibi A, Heidari G, Sohrabi Y, Badakhshan H, Mohammadi K. Influence of bio, organic and chemical fertilizers on medic-inal pumpkin traits. Journal of Medicinal Plants Research. 2011; 5(23):5590-5597.
17. Mahfouz SA, Sharaf-Eldin MA. Effect of mineral vs. biofertilizer on growth, yield, and essential oilcontent of fennel (*Foeniculum vulgare* Mill.). Int. Agrophys. 2007; 21:361-366.
18. Manea AI, AL-Bayati HJ, AL-Taey DKA. Impact of yeast extract, zinc sulphate and organic fertilizers spraying on potato growth and yield. Res. on Crops. 2019; 20(1):95-100
19. Mohammad BE, Ehsan R, Amin A. Climatic suitability of growing summer squash (*Cucurbita pepo* L.) as a medicinal plant in Iran. Not Sci Biol. 2011; 3(2):39-46.
20. Muneshwar RC, Dubey G, Prasad Navneet. (eds.) Microbes: Agriculture, Industry and Environment. Bishen Singh Mahendra Pal Singh, Dehra Dun, India, 2001.
21. Page AL, Miller RH, Keeney DR. Methods of soil Analysis. Part 2. Chemical & Microbiological properties. Am. Soc. Agron. Madision, WI, 1982.
22. Sarhan TZ, Ghurbat H, Mohammed, Jiyan A. Teel. Effecc of Bio and Organic Fertilizers on growth yield and fruit quality Summer Squash. Sarhad. Sarhad. J. Agric. 2011; 27(3):377-383.
23. Tamer CE, Ncedayi B, Parseker AS, Yonak S, ÖU

Çopur. Evaluation of several quality criteria of low calorie pumpkin dessert. Not Bot Hort Agrobot Cluj. 2010; 38:76-80.
24. Valadabadi SA, Farahani HA. Investigation of biofertilizers influence on quantity and quality characteristics in Nigellasativa L. Journal of Horticulture and Forestry. 2011; 3(3):31-40.