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INFLUENCE OF INORGANIC NITROGEN, PHOSPHORUS AND BIO-FERTILIZERS ON GROWTH, YIELD AND YIELD COMPONENTS AND NUTRIENT UPTAKE OF CUCUMBER (*Cucumis sativus* L.)

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ABSTRACT

Two field experiments were conducted during 2010 and 2011 seasons at Sids Horticultural Researh Station, Beni Swif Governorate, Egypt to investigate the effect of inorganic nitrogen and phosphorus fertilizers and bio-fertilizers, namely, Biogen and phosphorine on cucumber growth characters (vine length, shoot fresh and dry weights and number of leaves/plant), yield components (fruit length, fruit girth, number of fruit/plant and fruit weight/plant), early yield as the sum of the first three picking of fruits (number of early fruits/plant, early yield, kg/plant and early yield, t/fed), yield (number of total fruit, total yield/plant and total yield t/fed) and N, P and K uptake of cucumber shoots.

Results could be summerized as follows:

- Nitrogen fertilizer at 90 kg/fed yielded the highest values of growth parameters, yield and its components, early yield and nutrient content These parameters, also responded to bio-fertilizers and inorganic phosphorus fertilizer at 9.8 kg P/fed, except fruit girth which did not affected by bio-fertilizer or phosphorus.
- The combined of 70 kg N/fed + 6.8 kg P/fed + Biogen + Phosphorine treatment seemed to be the best treatment for all studied parameters, which means the posibality of saving about 20 kg N/fed and 3 kg P/ fed by combined nitrogen and phosphorus bio-fertilizers with inorganic sources.

Keywords: Cucumber, growth parameters, yield and yield components, early yield and nutrient uptake.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is the fourth most cultivated vegetable in the world and known to be one of the best foods for our body's overall health, often reffered to as a superfood. Cucumber are often sprayed with pesticides so it is important to buy organic or even better, grow them your self. Cucumber is a good source of B vitamins, it contain lariciresinol, pinoresinol and secoisolariciresinol which reduced risk of several cancer types, and it can be used for skin irritations and sunburns as also would be used. The cucumber fruit, are eaten fresh in salads in accompaniment with other vegetables. The soils where cucumber is cultivaited require moderate to high nutrient levels so as to achieve high yields. Infertile soils result in bitter and misshapen fruits which are often rejected by consumers, thereby reducing farmers inocome (Eifediyi and Remison, 2010).

Continuous application of heavy doses of chemical fertilizers without organic manures or bio-fertilizers has lead to a deterioration of soil health in terms of physical and chemical properties of soil, declining of soil microbial activities reducing in soil humus, increased pollution of soil, water and air.

Hence, integrated supply of nutients through organic, inorganic and bio-fertilizers is the need of the hour for sustainable productivity and to maintain better soil health. Hence, there is a need to standardize the integrated nutrient management practives for cucumber growing under open condition to get early yield and higher productivity and quality of produce under Egyptian conditions.

It is well established that mineral nitrogen and phosphorus fertilizers are of special important in terms of crop production enhancement. Lawal (2000), Agba and Enya (2005) and Eifediyi and Sumson (2010) had reported increase in growth and yield components of cucumber to applied chemical fertilizers.

Ali *et al*. (2011) reported that maximum yield of dry matter of cucumber and N, P and K content were obtained by application of the highest doses of N and P as aqua ammonia and phosphoric acid. Ruiz and Romero(1998) stated that the fruits of cucumber treated with nitrogen at rates of 10 g m^{-2} and 20 g m^{-2} were best for human consumption and economic profit than under 2.5 g m^{-2}, 5 g m^{-2} and 40 g m^{-2}

Bio-fertilizer is defined as a substance which containes living organisms which, when applied to seed plant surface, or soil, colonize the rhizosphere or interior of the plant and promote growth by increasing the supply or availability of primary nutrients to the host plant. Bio-fertilizers are well recognized as an important component of integrated plant nutrient management for sustainable agriculture and hold a great promise improve crop yield (Isfahani and Besharati, 2012). Nirmala *et al*.(1999) indicated that cucumber plants provids with Azotobacter + phosphobacteria + trichoderma in combined with inorganic and organic fertilizers recorded the lowest sex ratio which may be due to the production of almost same number of female flowers as that of male flowers. Many authers indicated that the growth characters, yield and its components were significantly improved due to bio-fertilization such as Hanna and Adams (1991), Muniz *et al*. (1992), Yingjajawal and Marukmon (1993), Resend and Pessoa (1996), Patil *et al*. (1998), Choudhari and More (2002) and Isfahani and Besharati (2012).

The objectives of this work were to assess the effect of three levels of both of nitrogen fertilizer (50, 70 and 90 kg/fed) and phosphorus (6.8, 9.8 and 13.5 kg P/fed which equal to 15.5, 22.5 and 31 kg P_2O_5/fed) with or without two comercial bio-fertilizers, namely, Biogen and Phosphorine on the growth, yield and its components, netincome and N, P and K content and uptake by cucumber vine.

MATERIALS AND METHODS

Two field experiments were conducted during 2010 and 2011 seasons at Sids Horticultural Researh Station, Beni-Swif Governorate, Egypt to study the effect of inorganic nitrogen and phosphorus fertilizers as well as some commercial biofertilizers, namely Biogen and Phosphorine on growth characters of cucumber, i.e. vine length (m), shoot fresh and dry weight/plant

(kg), and number of leaves/plant; yield components [fruit length (cm), fruit girth (cm), number of friuts/plant, fruit weight/plant (kg)], early yield as the sum of the first three picking of fruits [number of early fruits/plant, early yield (kg/plant) and early yield (t/fed)] and yield, i.e. number of total fruits, total yield (kg/plant) and total yield (t/fed) as well as N, P and K concentrations and uptake by cucumber shoots.

The experimental soil for the two seasons were clay loam with pH values of 7.90; 7.95 (1: 2.5, soil-water suspention), EC values of 1.55 and 1.62 (dSm^{-1}, in soil paste), organic matter values of 1.65 and 1.60%, soil available N, P and K were 22, 20; 11, 9 and 210, 200 ppm in the two seasons, respectively (according to Jackson, 1973).

The experiment was laid out in a factorial design in completely randomized block in three factors [nitrogen levels, i.e. 50, 70 and 90 kg N/fed, phosphorus levels (6.8, 9.8 and 13.5 kg P/fed) and biofertilizers (Biogen + Phosphorine) with and without]. The treatments were 18. Each replicate plot was 4 x 5 m. Two seeds of cucumber exported hybrid (Thameen) were sown per hole in rows with 1.20 m row spacing and 0.3 m seed bed, spacing on September which was later thinned down to one plant per stand after two weeks to give a population of 11600 plant/fed. Furrow irrigation system were adopted in the field, based on the conventional schedule. Nitrogen levels were added in two equal doses before the first and second irrigation, while phosphorus levels were added as calcium superphosphate fertilizer (15.5% P_2O_5) before sowing. Two biofertilizers formulations; Biogen and Phosphorine which provided by Department of Microbiology, Soil, Water and Environment Institute, ARC were mixed with Arabic gum and 1% glucose (w/w) for activating the product condidates. Cucumber seeds were coated by bacteria peat mixtures and sown. All cultural practices, i.e. irrigation, hoeing, potassium fertilization were carried out throughout the growing season as recommended.

N, P and K content and uptake were determined in cucumber shoots after last picking according to Chapman and Pratt (1961).

The data were recorded for vine length, shoot fresh and dry weights, number of leaves/plant, fruit length fruit girth, fruit number/plant, fruit weight, early and total yields at the end of picking. The data of all the above mentioned parameters were individually subjected to the analysis of variance techniques (Snedecor and Cochran, 1980). Subsequently, the significant means were separated by the least significant difference test by using MSTATC computer program.

RESULTS AND DISCUSSION

Growth parameters:

The growth parameters of cucumber plants as affected by inorganic and bio-fertilizers of N and P are shown in Tables (1 and 2). The results indicate that inorganic nitrogen fertilization had a

Table (1): Growth parameters of cucumber as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen+Phosphorine											
		Vine length (cm)			Shoot fresh weight/plant (kg)			Shoot dry weight/plant (kg)			Number of leaves/plant		
		-	+	Mean	-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	203.3	213.6	208.5	2.17	2.25	2.21	0.355	0.361	0.358	45.32	47.52	46.42
	9.8	223.5	240.9	232.2	2.33	2.53	2.43	0.370	0.391	0.381	47.76	50.17	48.97
	13.5	223.7	240.7	232.2	2.34	2.54	2.44	0.371	0.392	0.382	47.72	50.09	48.91
	Mean	**216.8**	**231.7**	**224.3**	**2.28**	**2.44**	**2.36**	**0.365**	**0.381**	**0.374**	**46.93**	**49.26**	**48.10**
70	6.8	261.7	272.3	267.0	2.62	2.77	2.70	0.373	0.402	0.388	58.82	60.83	59.82
	9.8	272.3	272.0	272.2	2.81	2.83	2.82	0.441	0.441	0.441	61.17	61.25	61.21
	13.5	271.8	271.6	271.7	2.83	2.82	2.83	0.440	0.443	0.442	61.30	61.16	61.23
	Mean	**268.6**	**271.9**	**270.9**	**2.75**	**2.81**	**2.78**	**0.418**	**0.429**	**0.424**	**60.43**	**61.08**	**60.75**
90	6.8	266.5	267.0	266.8	2.76	2.87	2.82	0.421	0.451	0.436	60.56	61.30	60.93
	9.8	271.0	271.3	271.2	2.85	2.87	2.86	0.426	0.446	0.436	61.21	61.27	61.24
	13.5	270.9	271.5	271.2	2.83	2.86	2.85	0.447	0.451	0.449	61.27	61.25	61.26
	Mean	**269.5**	**269.9**	**269.7**	**2.81**	**2.87**	**2.84**	**0.431**	**0.449**	**0.449**	**61.01**	**61.27**	**61.14**
Mean of P	6.8	243.8	250.9	247.4	2.52	2.63	2.58	0.383	0.405	0.395	54.90	56.55	55.72
	9.8	255.6	261.4	258.5	2.66	2.74	2.70	0.412	0.412	0.419	56.71	57.56	57.14
	13.5	255.6	261.3	258.4	2.67	2.74	2.71	0.419	0.429	0.424	56.76	57.50	57.13
Mean of bio-fertilizer		**251.6**	**257.8**	**254.8**	**2.61**	**2.70**	**2.66**	**0.405**	**0.419**	**0.413**	**56.12**	**57.20**	**56.66**
L.S.D at 0.05													
A				**3.36**			**0.07**			**0.031**			**4.54**
B				**2.61**			**0.06**			**0.005**			**0.37**
C				**1.92**			**0.04**			**0.003**			**0.31**
AB				**NS**			**NS**			**NS**			**NS**
AC				**2.07**			**0.07**			**0.020**			**0.51**
BC				**1.15**			**0.09**			**0.020**			**0.50**
ABC				**4.35**			**0.09**			**0.021**			**0.63**

Table (2): Growth parameters of cucumber as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen+Phosphorine											
		Vine length (cm)			Shoot fresh weight/plant (kg)			Shoot dry weight/plant (kg)			Number of leaves/plant		
		-	+	Mean	-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	210.3	223.5	216.9	2.21	2.30	2.25	0.365	0.406	0.385	45.11	47.69	46.40
	9.8	221.6	232.0	226.8	2.29	2.40	2.35	0.383	0.406	0.395	47.25	50.30	48.77
	13.5	220.9	231.8	226.4	2.29	2.38	2.34	0.381	0.405	0.393	47.32	50.29	48.81
	Mean	**217.6**	**229.1**	**223.4**	**2.26**	**2.36**	**2.31**	**0.376**	**0.406**	**0.391**	**46.56**	**49.43**	**47.99**
70	6.8	270.1	280.7	275.4	2.69	2.80	2.75	0.382	0.423	0.403	59.09	62.36	60.72
	9.8	289.5	290.1	289.8	2.81	2.83	2.82	0.450	0.450	0.450	62.35	62.36	62.35
	13.5	290.5	290.9	290.7	2.84	2.82	2.83	0.440	0.451	0.445	62.36	62.32	62.34
	Mean	**283.4**	**287.2**	**285.3**	**2.78**	**2.82**	**2.80**	**0.424**	**0.441**	**0.433**	**61.27**	**62.35**	**61.81**
90	6.8	278.5	290.3	284.4	2.75	2.82	2.79	0.426	0.453	0.439	60.69	62.35	61.52
	9.8	291.6	289.1	290.4	2.83	2.82	2.83	0.446	0.467	0.456	62.31	62.29	62.30
	13.5	289.6	250.1	289.9	2.82	2.84	2.83	0.446	0.451	0.448	62.33	62.35	62.30
	Mean	**286.6**	**276.5**	**288.2**	**2.80**	**2.83**	**2.82**	**0.439**	**0.457**	**0.448**	**61.77**	**62.33**	**62.04**
Mean of P	6.8	252.9	264.4	258.9	2.55	2.64	2.58	0.391	0.427	0.409	54.97	57.47	56.22
	9.8	267.6	270.4	269.0	2.64	2.69	2.67	0.426	0.441	0.433	57.31	58.51	57.81
	13.5	267.0	270.9	269.0	2.65	2.67	2.67	0.422	0.436	0.429	57.34	58.33	57.82
Mean of bio-fertilizer		**262.3**	**264.8**	**265.6**	**2.61**	**2.67**	**2.64**	**0.413**	**0.435**	**0.424**	**56.54**	**58.04**	**57.28**
L.S.D at 0.05													
A				**3.9**			**0.07**			**0.035**			**0.61**
B				**2.59**			**0.07**			**0.006**			**0.29**
C				**1.85**			**0.05**			**0.004**			**0.33**
AB				**NS**			**NS**			**NS**			**NS**
AC				**2.18**			**0.06**			**0.02**			**0.56**
BC				**1.19**			**0.08**			**0.02**			**0.51**
ABC				**3.67**			**0.09**			**0.25**			**0.75**

significant effect on all studied parameters, i.e. vine length, shoot and dry weight/plant and number of leaves/plant in both seasons, where increasing nitrogen levels up to 90 kg/ fed enhanced these parameters. This increasing in cucumber growth caused by nitrogen fertilizer may be due the increasing in intracellular meristemic activity and subsequently increase in internodes elongation. These results are in line with those obtained by Anjanappa *et al*. (2012) and Isfahani and Besharati (2012).

As for inorganic phosphorus effect, the data clearly show that, all studied cucumber plant growth were significantly responded to inorganic phosphorus fertilization in both seasons. It is worthy to notice that, in general, the difference between added 9.8 and 13.5 kg P/fed on cucumber growth parameters were not significant in both seasons. This results means that 9.8 kg P/fed is enough dose for cucumber growth. The promotive effect of phosphorus on plant growth is mainly due to its effect on improved eneregy formation, hence increase in photosynthesis. These resutl agree with the findings of Abdel-Mawgoud *et al*. (2005) and Eifediyi and Remison (2010).

Regarding the bio-fertilizers effect, the data show that Biogen and Phosphorine had a positive effect on growth parameters of cucumber. Inoculated cucumber plants with Biogen + Phosphorine increased vine length, shoot fresh and dry weights/plant and number of leaves/plant in both seasons. The positive effect of bio-fertilizers on cucumber growth may be due to these fertilizers contain active microorganisms with have a potential on increasing nutrient availablility, respectively improving nitrogen fixation and phosphate solubility (Ponmurugan and Gopi, 2006) and Isfahani and Besharati (2012).

Concerning the interaction effect between treatments, the data show that the cucumber growth parameters were significantly affected by the interactions between treatments AC, BC as well as the interaction among the three treatment (ABC) in both seasons, where bio-fertilizers were not affected the growth of cucumber under the high levels of nitrogen and/or phosphorus. In general, treated cucumber plants with 70 kg N/fed + 6.8 kg P/fed + bio-fertilizers gave the highest values of growth parameters, which in bar to that obtained under the highest values of both nitrogen and phosphorus. Similar results were obtained by Mahfouz and Shuraf-Eldin (2007) and Isfahani and Besharati (2012).

Yield components:

The results in Tables (3 and 4) represent the effect of chemical nitrogen and phosphorus fertilizers and bio-fertilizers on yield components of cucumber. The data show that, irrespective to the other two treatments, fruit length, fruit girth, fruit number/plant and fruit weight were significantly responded to increasing nitrogen level up to 90 kg/fed. The enhancement of cucumber yield components caused by nitrogen fertilization may be due to the proper nitrogen level promote vigorous growth of cucumber plant as mentioned before (Tables 1 and 2) which ultimately increased the yield components Jilani *et al*. (2008) These results are similar to these obtained by and Waseem *et al*. (2008).

As for phosphorus application, the results reveal that yield components of cucumber plants were significantly affected by chemical phosphorus fertilization in both seasons, except fruit girth which not affected by phosphorus application. It is obvious to notice that increasing phosphorus level from 9.8 to 13.5 kg P/fed did not significantly affect cucumber yield components. The response of yield components to phosphorus application is mainly due to its effect on cucumber growth parameters as discussed before (Tables 1 and 2). The results are in harmony with those obtained by Rubeiz (1990); Choudhari and More (2002).

Table (3):Yield components of cucumber as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen+Phosphorine											
		Fruit length (cm)			Fruit girth (cm)			Fruit number/plant			Fruit weight (g)		
		-	+	Mean	-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	12.41	13.05	12.73	4.42	4.46	4.44	26.45	27.85	27.15	96.12	101.62	98.87
	9.8	13.17	13.71	13.44	4.45	4.46	4.46	28.11	29.14	28.63	100.31	105.36	102.84
	13.5	13.18	13.71	13.44	4.45	4.41	4.43	28.16	29.17	28.66	100.37	105.36	102.87
	Mean	**12.92**	**13.64**	**12.20**	**4.44**	**4.44**	**4.43**	**27.57**	**28.72**	**28.15**	**98.93**	**104.11**	**101.53**
70	6.8	15.42	16.03	15.72	5.25	5.30	5.28	32.72	33.67	33.20	119.25	129.33	124.29
	9.8	16.69	16.72	16.71	5.26	5.30	5.28	35.66	35.70	35.68	129.36	129.30	129.34
	13.5	16.76	16.75	16.76	5.30	5.28	5.29	35.66	35.72	35.69	129.30	129.25	129.28
	Mean	**16.29**	**16.50**	**16.40**	**5.27**	**5.29**	**5.28**	**34.68**	**35.03**	**34.86**	**125.97**	**129.29**	**127.64**
90	6.8	16.21	16.75	16.48	5.79	5.80	5.79	34.71	35.69	35.20	126.41	129.39	127.90
	9.8	16.77	16.76	16.76	5.80	5.79	5.79	35.70	35.66	35.68	129.37	129.35	129.36
	13.5	16.75	16.74	16.75	5.79	5.79	5.79	35.69	35.72	35.71	129.39	129.40	129.40
	Mean	**16.57**	**16.74**	**16.66**	**5.79**	**5.79**	**5.79**	**35.37**	**35.69**	**35.53**	**128.39**	**129.38**	**128.89**
Mean of P	6.8	14.68	15.28	14.98	5.15	5.19	5.17	31.29	32.40	31.85	113.93	120.11	117.02
	9.8	15.54	15.73	15.64	5.17	5.18	5.18	33.16	33.50	33.33	119.68	121.34	120.51
	13.5	15.56	15.28	15.65	5.18	5.20	5.15	33.17	33.54	33.35	119.69	121.34	133.72
Mean of bio-fertilizer		**15.26**	**15.63**	**15.09**	**5.17**	**5.17**	**5.17**	**32.54**	**33.15**	**32.85**	**117.76**	**120.93**	**119.35**
L.S.D at 0.05													
A				**1.32**			**0.51**			**2.65**			**1.10**
B				**0.48**			**NS**			**1.19**			**2.15**
C				**0.40**			**0.02**			**0.37**			**1.71**
AB				**NS**			**NS**			**NS**			**NS**
AC				**0.02**			**0.01**			**0.41**			**1.83**
BC				**0.02**			**NS**			**0.30**			**1.54**
ABC				**0.11**			**0.03**			**0.63**			**1.70**

Considering bio-fertilizers, the data show that inoculation cucumber seeds with Biogen plus Phosphorine resulted in significant enhancement of yield components, except fruit girth which not affected by bio-fertilizers. Kucey *et al*. (1989) and Ponmurugan and Gopi (2006) mentioned that micro-organisms increased the availablility of N and P and enhance the plant growth, consequently improved yield components of plants. These results are in line with those obtained by Son *et al*. (2006) and Sharama *et al*. (2007).

With regard to the interaction between treatments, the data show that fruit length, fruit number and fruit weight were affected by the interaction between nitrogen or phosphorus and bio-fertilizers as well as among the three factors. These parameters not affected by bio-fertilization under the high dose of nitrogen or posphorus. While, fruit girth affected only by the interaction between nitrogen and bio-fertilizers, where bio-fertilizers not affected fruit girth under the high level of nitrogen. Furthermore, the three way interaction (A x B x C) indicate that 70 kg N/fed + 6.8 kg P/fed + Biogen +

Phosphorine yielded the highest values of cucumber yield components equal to those produce by the highest inorganic chemical fertilizers. Anjanappa *et al*. (2012) explaind the increase of cucumber yield components by using inorganic and bio-fertilizers to balanced nutrition, better nutrient uptake and synthesis of more carbohydrates as well as increased chlorophyll content in leaf resulting in higher photosynthesis leading to increased fruit parameters. These results are conformity with findings of Patil *et al*. (1998) and Umamaheshwarappa *et al*. (2005).

Table (4):Yield components of cucumber as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen+Phosphorine											
		Fruit length (cm)			Fruit girth (cm)			Fruit number/plant			Fruit weight (g)		
		-	+	Mean	-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	12.52	13.16	12.84	4.43	4.44	4.43	25.56	27.91	26.73	96.17	101.72	98.95
	9.8	13.19	13.71	13.45	4.42	4.46	4.44	28.25	29.27	28.76	101.40	105.44	103.42
	13.5	13.25	13.74	13.50	4.38	4.37	4.38	28.27	29.26	28.77	101.39	105.42	103.41
	Mean	**12.99**	**13.54**	**13.26**	**4.41**	**4.42**	**4.42**	**27.36**	**28.81**	**28.09**	**99.65**	**104.19**	**101.93**
70	6.8	15.72	16.32	16.02	5.42	5.43	5.43	32.80	35.81	34.31	119.40	129.55	124.48
	9.8	16.91	16.92	16.92	5.46	5.43	5.45	35.79	35.80	35.80	129.60	129.56	129.58
	13.5	16.93	16.90	16.92	5.50	5.46	5.48	35.82	35.79	35.81	129.51	129.44	129.48
	Mean	**16.52**	**16.71**	**16.92**	**5.46**	**5.45**	**5.46**	**34.80**	**35.80**	**35.80**	**126.17**	**129.51**	**127.85**
90	6.8	16.41	16.92	16.67	7.83	7.85	7.84	34.85	35.77	35.31	125.01	129.05	127.03
	9.8	16.91	16.93	16.92	7.79	7.82	7.81	35.81	35.83	35.82	129.56	129.48	129.52
	13.5	16.89	16.90	16.90	7.80	7.82	7.83	35.79	35.85	35.82	129.60	129.59	129.60
	Mean	**16.74**	**50.75**	**16.83**	**7.81**	**7.83**	**7.82**	**35.48**	**35.82**	**35.65**	**128.05**	**129.37**	**128.72**
Mean of P	6.8	14.88	15.47	15.18	5.89	5.91	5.90	31.07	33.16	32.12	113.53	120.11	116.82
	9.8	15.67	15.85	15.76	5.89	5.92	5.90	33.28	33.63	33.46	120.19	121.49	120.84
	13.5	15.69	15.85	15.77	5.89	5.89	5.89	33.29	33.63	33.47	120.17	121.48	120.83
Mean of bio-fertilizer		**15.42**	**27.00**	**15.67**	**5.89**	**5.89**	**5.90**	**32.55**	**33.48**	**33.18**	**117.96**	**121.02**	**119.50**
L.S.D at 0.05													
A				**1.15**			**0.57**			**1.87**			**1.15**
B				**0.40**			**NS**			**1.10**			**2.11**
C				**0.43**			**0.01**			**0.25**			**1.56**
AB				**NS**			**NS**			**NS**			**NS**
AC				**0.02**			**0.01**			**0.93**			**1.53**
BC				**0.02**			**NS**			**0.32**			**1.37**
ABC				**0.15**			**0.3**			**0.70**			**1.63**

Early yield:

Results illustrated in Tables (5 and 6) show the effect of inorganic chemical fertilizers of N and P and bio-fertilizer (Biogen + phosphorine) and their interactions on early yield, i.e. the sum of the first, second and third picking of cucumber in the two seasons. The statistical analysis of data show that the effect of inorganic nitrogen fertilizers on early yield was significant, however 70 kg N/fed showed better effect on number of early fruits/plant, early yield/plant and early yield (t/fed) than 50 and 90 kg N/fed. It is obvious to notice that increment in nitrogen level significantly decreased early yield parameters. The reduction effect of high nitrogen dose may be due to the high nitrogen application promote vigorus vegetative growth, which in turn delay the beginnig of flowering (El-Shabrawy, 2011). In this concern, Jilani *et al*. (2008) stated that the moderated level of NPK fertilizers produced the

minmum days taken to cucumber fruit maturity. They added that the deficiency of major nutrients stunted the plant growth, resulting in prolonged time taken to fruit setting. These results are similar to those obtained by Waseem *et al*. (2008).

Considering phosphorus treatment the data obtained reveal that early parameters were positively affected by phosphorus application. It was observed that the higher the phosphorus applied, the higher the values of number of early fruits/plant, early yield/plant and early yield/fed in both seasons. This may be due to phosphorus is an important element and essential for initiation of flowering resulted in early yield (Anjanappa *et al*. (2012). Similar results were obtained by Nirmala *et al*. (1999).

Table (5): Early yield of cucumber as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		Nmber of early fruits/plant			Early yield/ plant (kg)			Early yield (t/fed)		
		-	+	Mean	-	+	Mean	-	+	Mean
50	**6.8**	5.99	6.19	6.09	0.450	0.471	0.460	4.25	4.46	4.36
	9.8	6.25	6.42	6.34	0.472	0.483	0.478	4.46	4.58	4.52
	13.5	6.62	6.81	6.72	0.513	0.531	0.522	4.88	5.03	4.96
	Mean	**6.29**	**6.47**	**6.38**	**0.478**	**0.495**	**0.487**	**4.53**	**4.69**	**4.61**
70	**6.8**	6.26	6.42	6.34	0.473	0.487	0.480	4.47	4.63	4.55
	9.8	6.70	6.84	6.77	0.513	0.519	0.516	4.88	4.92	4.90
	13.5	6.97	7.13	7.05	0.533	0.540	0.537	5.07	5.13	5.10
	Mean	**6.64**	**6.80**	**6.72**	**0.506**	**0.515**	**0.511**	**4.81**	**4.89**	**4.85**
90	**6.8**	6.01	6.23	6.12	0.460	0.490	0.475	4.38	4.66	4.52
	9.8	6.47	6.63	6.55	0.481	0.502	0.491	4.57	4.78	4.68
	13.5	6.81	6.80	6.81	0.521	0.519	0.520	4.96	4.93	4.95
	Mean	**6.43**	**6.55**	**6.49**	**0.487**	**0.504**	**0.495**	**4.64**	**4.79**	**4.72**
Mean of P	**6.8**	6.09	6.28	6.18	0.461	0.483	0.472	4.37	4.58	4.48
	9.8	6.47	6.63	6.55	0.489	0.501	0.495	4.64	4.76	4.70
	13.5	6.80	6.90	6.86	0.522	0.530	0.526	4.97	5.03	5.00
Mean of bio-fertilizer		**6.45**	**6.60**	**6.53**	**0.490**	**0.505**	**0.498**	**4.66**	**4.79**	**4.73**
L.S.D. at 0.05										
A				**0.27**			**0.013**			**0.17**
B				**0.32**			**0.19**			**0.21**
C				**0.11**			**0.01**			**0.10**
AB				**NS**			**NS**			**NS**
AC				**NS**			**NS**			**NS**
BC				**0.12**			**0.01**			**0.12**
ABC				**0.14**			**0.015**			**0.15**

As for bio-fertilizers, the results clear that early yield of cucumber plants was positively responded to using bio-fertilizers in both seasons. Nirmala *et al*. (1999) explained this result to the cucumber plants provided with nitrogen and phosphorus bio-fertilizers recorded the lowest sex ratio, which may be due the production of almost same number of female flowers as that male flowers, consequently decreased fruit setting which led to early yield.

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Table (6): Early yield of cucumber as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen+Phosphorine								
		Nmber of early fruits/plants			Early yield/ plant (kg)			Early yield (t/fed)		
		-	+	Mean	-	+	Mean	-	+	Mean
50	**6.8**	6.35	6.53	6.44	0.510	0.526	0.518	4.54	4.72	4.63
	9.8	6.35	6.56	6.46	0.511	0.528	0.520	4.70	4.80	4.75
	13.5	6.67	6.89	6.78	0.539	0.560	0.550	4.85	5.01	4.93
	Mean	**6.46**	**6.66**	**6.56**	**0.520**	**0.538**	**0.529**	**4.69**	**4.84**	**4.77**
70	**6.8**	6.41	6.53	6.47	0.522	0.528	0.525	4.72	4.86	4.79
	9.8	6.81	6.93	6.87	0.550	0.559	0.555	5.13	5.26	5.20
	13.5	7.10	7.31	7.21	0.577	0.583	0.580	5.29	5.47	5.38
	Mean	**6.77**	**6.92**	**6.85**	**0.549**	**0.556**	**0.553**	**5.04**	**5.19**	**5.12**
90	**6.8**	6.25	6.39	6.32	0.508	0.522	0.515	4.62	4.77	4.70
	9.8	6.70	6.90	6.80	0.535	0.556	0.540	4.85	4.90	4.88
	13.5	6.99	6.96	6.98	0.566	0.559	0.562	4.96	5.02	4.49
	Mean	**6.64**	**6.75**	**6.70**	**0.536**	**0.545**	**0.539**	**4.81**	**4.90**	**4.69**
Mean of P	**6.8**	6.34	6.48	6.41	0.513	0.525	0.519	4.63	4.78	4.71
	9.8	6.62	6.80	6.71	0.532	0.547	0.538	4.89	4.99	4.94
	13.5	6.92	7.05	6.99	0.560	0.567	0.564	5.03	4.93	4.93
Mean of bio-fertilizer		**6.62**	**6.78**	**6.70**	**0.535**	**0.546**	**0.540**	**4.85**	**4.98**	**4.86**
L.S.D at 0.05										
A				**0.25**			**0.015**			**0.18**
B				**0.36**			**0.200**			**0.25**
C				**0.10**			**0.010**			**0.11**
AB				**NS**			**NS**			**NS**
AC				**NS**			**NS**			**NS**
BC				**0.13**			**0.010**			**0.12**
ABC				**0.15**			**0.013**			**0.14**

With regard to the interaction effect, the statistical analysis show that early yield parameters responded only to the interactions between phosphorus and bio-fertilizers as well as among the three factors (A x B x C). The using of bio-fertilizers not affected early parameters under the high phosphorus dose (13.5 kg P/fed). Also, early yield not responded to the high levels of nitrogen plus phosphorus (A x B x C). In general, cucumber plants supplied with 70 kg N/fed + 13.5 kg P/fed + Biogen and Phosphorine inoculant produce the highest values of early yield in both seasons. While, the plants treated with 50 kg N/fed + 6.8 kg P/fed without bio-fertilization recorded the lowest early parameters. These results are in similar to those obtained by Anjanappa *et al*. (2012) who reported that combination of

inorganic and bio-fertilizer helped in enhanced uptake of nutrients which promotes faster plant growth leading to increase of higher number of male and female lowers, consequently improved fruit setting and ealry yield.

Yield parameters:

Data presented in Tables (7 and 8) show the effect of inorganic and bio-fertilizers of nitrogen and phosphorus on cucumber yield parameters. The results indicate that number of fruits/plant, total yield (kg/plant) and total yield (t/fed) were significantly affected by nitrogen fertilization in both seasons. It was observed that the higher the nitrogen applied (90 kg/fed), the higher the values of the cucumber yield. The relative increasing of total yield (t/fed) due to added 90 kg N/fed reached to 19% over 50 kg N/fed in the first season. The same trends were obtained in the second season and other parameters. the promotive effect of nitrogen on yield is mainly due to its positive effect on growth and yield components of cucumber as discussed before in Tables (1, 2, 3, and 4), hence increased yield parameters. This results are in line with those obtained by Ahmed *et al*. (2007) and Waseem *et al*. (2008).

As for phosphorus application, the data reveal that, irrespective of inorganic nitrogen and bio-fertilization, different levels of P fertilizer have a significant effect of the yield parameters. Added 9.8 kg P/fed seemed to be the favour phosphorus dose of cucumber yield in both seasons. It is worthy to differences between the effect of added 9.8 and 13.5 kg P/fed on yield parameters were not significant. The increment of yield is may explained by the cucumber vegetative growth such as vine length, shoot fresh and dry weights and number of leaves were significantly responded to inorganic phosphorus (Tables 1 and 2), this result in the development of the plants and its photosynthetic appartus and therefore enhancing assimilate production and accumulation. The assimilates produced during photosynthesis were translocated to various sinks which resulted in the increase in the weight and number of fruits per plant and total yield (Eifediyi and Remison, 2010). These results agree with the findings of Akinride (2006).

With regard to bio-fertilizers, the results indicate that the main effect of bio-fertilizers on yield parameters were significant. Inoculation of cucumber plants with Biogen plus Phosphorine increased number of total fruits/plant, total yield/plant and total yield/fed by about 2.7, 2.3 and 2.3% in the frist season, respectively. The same trends were obtained in the second season. Vessey (2003) explain the positive effect of bio-fertilizers on plant yield to bio-fertilizer contain living micro-organismis colonize the rhizosphere or interior of plants and promote growth of the biological N2 fixation (Rhizobium and Azotobacter), increasing the availablility of nutrients to rhizosphere, incducing in increases root surface area, enhancing other benifical symbioses of the host and suppression of plant pathogens and induced resistance. Similar results were obtained by Choudhari and More (2002) and Anjanappa *et al*. (2012).

Table (7): Yield parameters of cucumber as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		Number of total fruits/plant			Total yield (kg/plant)			Total yield (t/fed)		
		-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	15.90	16.90	16.40	1.011	1.110	1.061	9.750	10.462	10.106
	9.8	16.89	17.45	17.17	1.251	1.302	1.277	10.180	10.709	10.445
	13.5	19.91	17.40	17.16	1.297	1.300	1.299	10.189	10.713	10.451
	Mean	**16.57**	**17.25**	**16.91**	**1.186**	**1.237**	**1.212**	**10.040**	**10.628**	**10.334**
70	6.8	19.56	20.81	20.19	1.230	1.279	1.255	12.009	12.336	12.173
	9.8	20.85	20.82	20.84	1.354	1.360	1.357	12.339	12.340	12.344
	13.5	20.79	20.85	20.82	1.356	1.357	1.357	12.342	12.338	12.340
	Mean	**20.40**	**20.83**	**20.62**	**1.313**	**1.332**	**1.323**	**12.230**	**12.338**	**12.284**
90	6.8	20.15	20.79	20.47	1.301	1.361	1.331	12.111	12.341	12.226
	9.8	20.82	20.81	20.80	1.357	1.360	1.359	12.338	12.344	12.341
	13.5	20.81	20.82	20.82	1.359	1.359	1.359	12.336	12.338	12.337
	Mean	**20.59**	**20.81**	**20.70**	**1.339**	**1.360**	**1.349**	**12.226**	**12.341**	**12.302**
Mean of P	6.8	18.54	19.50	19.02	1.181	1.250	1.216	11.290	11.713	11.502
	9.8	19.52	19.93	19.73	1.321	1.341	1.331	11.619	11.800	11.710
	13.5	19.50	19.69	19.60	1.337	1.339	1.338	11.622	11.796	11.709
Mean of bio-fertilizer		**19.19**	**19.65**	**19.41**	**1.279**	**1.310**	**1.295**	**11.499**	**11.769**	**11.640**
L.S.D. at 0.05										
A				**1.09**			**0.076**			**0.670**
B				**0.36**			**0.066**			**0.153**
C				**0.30**			**0.031**			**0.114**
AB				**NS**			**NS**			**NS**
AC				**0.42**			**0.047**			**0.26**
BC				**0.36**			**0.042**			**0.33**
ABC				**0.66**			**0.076**			**0.46**

With regard to the interaction effect, the obtained results revealed that yield parameters of cucumber plants were affected by the interaction between bio-fertilizers and inorganic nitrogen and/or phosphorus. Where, the high levels of both nitrogen and phosphorus inhibited the promotive effect of bio-fertilizers on cucumber yield. Once again, the highest cucumber yield parameters were obtained under the treatment 70 kg/fed + 6.8 kg P/fed + Biogen + Phosphorine, which on par with the treatments contain the high levels of fertilizers. In this concern, Anjanappa *et al*. (2012) mentioned that increased fruit yield under mixed inorganic, organic and bio-fertilizers could be atributed to lowest number of days taken for male and female flower appearance, production of more number of female flowers, number of fruits and fruit weight which were positively contributed towards fruit yields. They added that, increased yield was also due to balanced nutrition, better uptake of nutrients by the plants which helped for better fruit set and fruit yield. These results are similar to those obtained by Anjanappa *et al*. (2012) and Isfahani and Besharati (2012).

Table (8): Yield parameters of cucumber as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		Number of total fruits/plant			Total yield (kg/plant)			Total yield (t/fed)		
		-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	15.98	16.91	16.45	1.042	1.116	1.080	9.931	10.551	10.241
	9.8	16.97	17.53	17.25	1.319	1.354	1.321	10.241	10.819	10.530
	13.5	16.90	17.51	17.21	1.320	1.366	1.341	10.249	10.830	10.550
	Mean	**16.62**	**17.32**	**16.97**	**1.227**	**1.279**	**1.247**	**10.140**	**10.733**	**10.440**
70	6.8	19.62	20.85	20.24	1.272	1.380	1.331	12.153	12.629	12.391
	9.8	20.79	20.80	20.80	1.389	1.383	1.390	12.625	12.631	12.628
	13.5	20.82	20.83	20.83	1.380	1.382	1.380	12.629	12.628	12.629
	Mean	**20.41**	**20.83**	**20.62**	**1.347**	**1.381**	**1.367**	**12.469**	**12.629**	**12.549**
90	6.8	20.20	20.81	20.51	1.310	1.386	1.351	12.592	12.637	12.615
	9.8	20.78	20.83	20.81	1.386	1.381	1.380	12.631	12.630	12.631
	13.5	20.80	20.82	20.81	1.389	1.380	1.381	12.617	12.635	12.632
	Mean	**20.59**	**20.84**	**20.71**	**1.362**	**1.382**	**1.371**	**12.613**	**12.634**	**12.626**
Mean of P	6.8	18.67	19.52	19.07	1.212	1.292	1.254	11.562	11.941	11.752
	9.8	19.51	19.72	19.62	1.365	1.371	1.364	11.831	12.035	11.933
	13.5	13.51	19.72	19.61	1.363	1.380	1.367	11.842	12.032	11.937
Mean of bio-fertilizer		**19.21**	**19.66**	**19.43**	**1.312**	**1.347**	**1.328**	**11.741**	**11.999**	**11.872**
L.S.D. at 0.05										
A				**1.10**			**0.065**			**0.611**
B				**0.39**			**0.051**			**0.132**
C				**0.28**			**0.029**			**0.110**
AB				**NS**			**NS**			**NS**
AC				**0.46**			**0.051**			**0.21**
BC				**0.31**			**0.040**			**0.36**
ABC				**0.70**			**0.069**			**0.50**

Nutrient concentration and uptake by shoots:

The data in Tables (9, 10, 11 and 12) represent the N, P and K concentration and uptake by cucumber shoots. The data clearly show that nutrient concentration in the shoots of cucumber plants were not affected by inorganic nitrogen or phosphorus, or bio-fertilizers or their interactions in both seasons. The insignificant effect of the studied treatments on nutrient concentration may be due the dillation effect, since these treatments increased the cucumber dry weight as mentioned before.

Considering nutrient uptake, the results show that N, P and K uptake significantly responded to inorganic nitrogen fertilizer in both seasons. The higher the nitrogen doses was added, the higher N, P and K uptake by cucumber plants. The positive effect of nitrogen fertilizers on N, P and K uptake could be explained by the promotive effect of nitrogen on the dry weight of cucumber shoots (Tables 1 and 2), since nutrient uptake calculated as multiplying shoots dry weight by nutrient concentration. These results are harmony with those obtained by Ali *et al*. (2011).

Table (9): N, P and K concentration (%) in cucumber shoots as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		N			P			K		
		-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	1.13	1.16	1.15	0.63	0.64	0.64	1.21	1.23	1.22
	9.8	1.16	1.12	1.14	0.65	0.63	0.64	1.25	1.22	1.24
	13.5	1.15	1.13	1.14	0.63	0.61	0.62	1.22	1.23	1.23
	Mean	**1.15**	**1.14**	**1.14**	**0.64**	**0.63**	**0.63**	**1.23**	**1.23**	**1.23**
70	6.8	1.12	1.13	1.13	0.64	0.62	0.63	1.22	1.22	1.22
	9.8	1.09	1.12	1.11	0.65	0.63	0.64	1.21	1.21	1.21
	13.5	1.11	1.12	1.12	0.62	0.62	0.62	1.19	1.21	1.20
	Mean	**1.11**	**1.12**	**1.12**	**0.64**	**0.62**	**0.63**	**1.21**	**1.22**	**1.21**
90	6.8	1.16	1.11	1.14	0.63	0.61	0.62	1.23	1.21	1.22
	9.8	1.18	1.14	1.16	0.61	0.62	0.62	1.27	1.22	1.22
	13.5	1.23	1.12	1.18	0.62	0.62	0.62	1.22	1.21	1.21
	Mean	**1.19**	**1.12**	**1.16**	**0.62**	**0.62**	**0.62**	**1.22**	**1.21**	**1.22**
Mean of P	6.8	1.14	1.13	1.14	0.63	0.62	0.63	1.21	1.22	1.22
	9.8	1.14	1.13	1.14	0.64	0.62	0.64	1.22	1.22	1.22
	13.5	1.16	1.12	1.15	0.62	0.62	0.62	1.21	1.22	1.21
Mean of bio-fertilizer		**1.14**	**1.13**	**1.14**	**0.63**	**0.62**	**0.63**	**1.22**	**1.22**	**1.22**
L.S.D at 0.05										
A				**NS**			**NS**			**NS**
B				**NS**			**NS**			**NS**
C				**NS**			**NS**			**NS**
AB				**NS**			**NS**			**NS**
AC				**NS**			**NS**			**NS**
BC				**NS**			**NS**			**NS**
ABC				**NS**			**NS**			**NS**

Table (10): N, P and K concentration (%) in cucumber shoots as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		N			P			K		
		-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	1.08	1.09	1.09	0.62	0.61	0.62	1.16	1.15	1.15
	9.8	1.09	1.11	1.10	0.61	0.61	0.61	1.15	1.16	1.16
	13.5	1.10	1.11	1.11	0.61	0.62	0.62	1.15	1.16	1.16
	Mean	**1.09**	**1.11**	**1.10**	**0.61**	**0.62**	**0.62**	**1.15**	**1.16**	**1.16**
70	6.8	1.09	1.09	1.09	0.60	0.60	0.60	1.15	1.16	1.15
	9.8	1.10	1.10	1.10	0.61	0.61	0.61	1.14	1.15	1.14
	13.5	1.11	1.11	1.11	0.62	0.61	0.62	1.14	1.15	1.15
	Mean	**1.09**	**1.10**	**1.10**	**0.61**	**0.61**	**0.61**	**1.14**	**1.16**	**1.15**
90	6.8	1.10	1.09	1.10	0.62	0.61	0.61	1.16	1.15	1.15
	9.8	1.11	1.08	1.10	0.61	0.60	0.61	1.15	1.15	1.15
	13.5	1.11	1.09	1.10	0.62	0.61	0.62	1.15	1.15	1.15
	Mean	**1.10**	**1.09**	**1.10**	**0.62**	**0.61**	**0.61**	**1.15**	**1.15**	**1.15**
Mean of P	6.8	1.09	1.09	0.10	0.61	0.60	0.61	1.15	1.15	1.15
	9.8	1.10	1.10	0.10	0.61	0.61	0.61	1.15	1.16	1.15
	13.5	1.11	1.11	0.11	0.62	0.61	0.62	1.15	1.16	1.16
Mean of bio-fertilizer		**1.09**	**1.10**	**1.10**	**0.61**	**0.61**	**0.61**	**1.15**	**1.16**	**1.16**
L.S.D. at 0.05										
A				**NS**			**NS**			**NS**
B				**NS**			**NS**			**NS**
C				**NS**			**NS**			**NS**
AB				**NS**			**NS**			**NS**
AC				**NS**			**NS**			**NS**
BC				**NS**			**NS**			**NS**
ABC				**NS**			**NS**			**NS**

Table (11): N, P and K uptake by cucumber shoots (kg/fed) as affected by studied treatments in the first season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		N			P			K		
		-	+	Mean	-	+	Mean	-	+	Mean
50	**6.8**	43.37	48.60	45.99	24.71	27.30	26.05	46.50	51.37	48.94
	9.8	45.86	49.97	47.92	25.69	27.80	26.75	48.41	52.20	68.31
	13.5	46.05	49.49	47.77	25.52	27.80	26.66	48.33	51.89	50.11
	Mean	**45.09**	**49.35**	**47.23**	**25.30**	**27.63**	**26.48**	**47.74**	**51.82**	**55.78**
70	**6.8**	45.86	50.83	48.35	25.29	28.16	26.72	48.76	53.90	51.33
	9.8	54.47	54.49	54.48	30.23	30.27	30.26	56.03	56.96	55.50
	13.5	53.79	54.52	54.16	29.91	30.29	30.10	55.87	57.03	56.45
	Mean	**49.16**	**53.19**	**52.34**	**28.47**	**29.57**	**29.03**	**53.55**	**55.96**	**54.43**
90	**6.8**	51.56	55.10	53.33	29.37	30.19	29.78	54.39	57.11	55.75
	9.8	55.10	54.57	54.84	30.15	30.53	30.34	56.43	28.70	56.64
	13.5	54.53	54.20	54.37	30.45	30.34	30.40	56.49	57.20	56.85
	Mean	**53.73**	**54.62**	**54.18**	**29.99**	**30.35**	**30.17**	**55.77**	**57.05**	**56.41**
Mean of P	**6.8**	46.93	51.51	49.24	26.46	28.55	27.51	49.88	54.12	46.34
	9.8	51.81	53.01	52.41	28.69	29.53	29.11	53.62	55.95	60.79
	13.5	51.45	52.64	52.10	28.62	29.48	29.06	53.56	55.37	44.49
Mean of bio-fertilizer		**49.33**	**52.38**	**51.25**	**27.92**	**29.18**	**28.56**	**52.26**	**55.15**	**55.54**
L.S.D. at 0.05										
A				**1.73**			**1.15**			**0.79**
B				**1.05**			**0.81**			**0.63**
C				**1.31**			**1.26**			**0.96**
AB				**NS**			**NS**			**NS**
AC				**1.80**			**1.15**			**1.10**
BC				**1.63**			**1.13**			**1.05**
ABC				**2.11**			**1.38**			**2.11**

As for inorganic phosphorus fertilizers the data reveal that N, P and K uptake were significantly responded to phosphorus application. Added 9.8 kg P/fed produced the highest nutrients uptake by cucumber shoots. The difference between 9.8 and 13.5 kg P/fed in the effect on nutrients uptake was not significant. This means that treated cucumber plants with 9.8 kg P/ fed resulted in higher N, P and K uptake, which in turn increased growth and yield of cucumber. Similar results were obtained by Ali et al. (2011) who found that treated cucumber plants with 3% phosphoric acid yielded highest amount of N, P and K uptake.

Concerning bio-fertilizers, the data obtained show that N, P and K uptake were significntly responded to bio-fertilizers. The highest N, P and K uptake were recorded under plants provided with Biogen + Phosphorine. This may be due to the promotive effect of bio-fertilizers on root dry weight which in turn increased nutrients uptaked by plants (Isfahani and Besharati, 2012**)**.

With regard to the interaction effect, the data obtained indicate that, the nutrient uptake affected by the interactions between nitrogen and bio-fertilizers (A x C), phosphorus and bio-fertilizers (B x C) and among the three treatments (A x B x C). In general, bio-fertilizers not affected N, P and K uptake under the high levels of nitrogen or phosphorus. The highest N, P and K uptake were yielded for the cucumber plants treated with 70 kg N/fed + 6.8 kg P/fed + Biogen + Phosphorine, which on bar to that uptaked under the highest nitrogen and phosphorus fertilizers.

Table (12): N, P and K uptake by cucumber shoots (kg/fed) as affected by studied treatments in the second season.

N kg/fed	P kg/fed	Biogen + Phosphorine								
		N			P			K		
		-	+	Mean	-	+	Mean	-	+	Mean
50	6.8	43.58	45.75	44.66	24.16	25.38	24.77	46.47	48.75	47.61
	9.8	47.23	48.15	47.69	26.31	27.09	26.70	50.81	52.30	51.55
	13.5	46.71	48.38	47.55	25.80	26.25	26.03	49.69	52.82	51.26
	Mean	**45.84**	**47.42**	**46.63**	**25.42**	**26.24**	**25.83**	**48.99**	**51.29**	**50.14**
70	6.8	45.39	49.82	47.61	26.15	27.31	26.73	49.65	53.61	51.63
	9.8	47.81	54.31	51.06	31.49	30.52	31.01	58.39	58.36	58.38
	13.5	54.82	54.31	54.57	30.67	30.23	30.45	58.93	58.53	58.73
	Mean	**49.34**	**52.81**	**51.08**	**29.44**	**29.35**	**29.39**	**55.66**	**56.83**	**56.25**
90	6.8	53.40	54.75	54.57	29.21	30.21	29.71	56.90	59.82	58.36
	9.8	56.73	55.78	56.26	30.22	30.09	30.16	59.80	59.11	59.46
	13.5	59.33	55.34	57.34	30.16	30.45	30.31	59.07	59.92	59.49
	Mean	**56.49**	**55.29**	**56.05**	**29.86**	**30.25**	**30.06**	**58.59**	**59.61**	**59.10**
Mean of P	6.8	47.46	50.11	48.94	26.51	27.63	27.07	51.01	54.06	52.54
	9.8	50.59	52.40	51.67	29.34	29.23	29.29	56.33	56.59	56.47
	13.5	53.62	52.68	53.15	28.89	28.98	28.93	55.89	57.09	56.50
Mean of bio-fertilizer		**50.56**	**51.62**	**51.25**	**28.24**	**28.63**	**28.43**	**54.41**	**55.84**	**55.16**
L.S.D. at 0.05										
A				**1.16**			**1.09**			**0.65**
B				**1.11**			**0.85**			**0.61**
C				**1.22**			**1.11**			**0.87**
AB				**NS**			**NS**			**NS**
AC				**1.76**			**1.10**			**1.03**
BC				**1.51**			**1.20**			**1.15**
ABC				**1.97**			**1.66**			**2.20**

CONCLUSION

It could be recommended to added 70 kg N/fed + 6.8 kg P/fed + bio-fertilizers (Biogen + Phosphorine) to improved cucumber productivity and minimized the use of chimecal fertilizers due to the its high price and aviod its effect on the environmental pollution.

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تأثير الأسمدة النتروجينية والفوسفاتية الغير عضوية والأسمدة الحيوية على النمو والمحصول ومكوناته وأمتصاص العناصر للخيار

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أقيمت تجربتان حقليتان فى محطة بحوث البساتين بسدس - مركز البحوث الزراعة خلال موسمى النمو ٢٠١٠، ٢٠١١ لدراسة تأثير أضافة الأسمدة النتروجينية والفوسفورية الغير عضوية والأسمدة الحيوية (بيوجين + فوسفورين) على صفات النمو (طول العرش، الوزن الطازج والجاف للنبات وعدد الأوراق للنبات) ومكونات المحصول (طول الثمرة، محيط الثمرة، عدد الثمار للنبات، ووزن الثمار للنبات، والتبكير (عدد ثمار الثلاث جمعات الأولى للنبات، محصول الثلاث جمعات الأولى للنبات، ومحصول الثلاث جمعات الأولى للفدان) والمحصول (عدد الثمار الكلى للنبات، المحصول الكلى للنبات، المحصول الكلى للفدان) وكذلك أمتصاص العناصر بالمجموع الخضرى.

ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلي:

- أدت أضافة ٩٠ كجم نتروجين للفدان إلى أعلى قيم من صفات النمو ومكونات المحصول والتبكير والمحصول وأمتصاص العناصر. كما استجابت تلك الصفات إلى الأسمدة الفوسفاتية عند مستوى ٨،٩ كجم فوسفور للفدان وكذلك إلى الأسمدة الحيوية ماعدا محيط الثمرة الذى لم يستجب للتسميد الفوسفاتى والحيوى.
- كانت معاملة خلط ٧٠ كجم نتروجين للفدان + ٨،٦ كجم فوسفور للفدان + السماد الحيوى بيوجين والسماد الحيوى فوسفورين هى أفضل معاملة للحصول على أعلى القيم لصفات ومحصول الخيار، وعلى ذلك يمكن التوصية بهذه المعاملة للحصول على أنتاجية جيدة للخيار وتوفير حوالى ٢٠ كجم نتروجين للفدان وحوالى ٣ كجم فوسفور للفدان مما يؤدى إلى قلة التكلفة وتجنب مخاطر تلوث البيئة بالأستخدام الزائد للأسمدة الكيميائية.

قام بتحكيم البحث

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