RESULTS & DISCUSSION

4. RESULTS AND DISCUSSION

4-1- Vegetative growth characteristics: -

Data presented at Table (2) show the effect of cultivars, phosphorus and phosphorine (P.D.B) bio-fertilizer on vegetative growth characteristics of common bean plants expressed as plant height, number of leaves and branches per plant, leaf area, fresh and dry weight of plant.

With regard the effect of cultivar such data indicated that there were a differences between the used cultivars Giza 6 and Bronco in all studied morphological characteristics of common bean plants. In this respect, such differences reached the level of 0.5% of significance in all studied growth aspects expect the average leaves area / plant and fresh weight during the first season, while in the second one it reached the level of significance only in case of plant height and dry weight of plant. These differences among the studied cvs. may be due to the differences in genetic potentiality of such cvs. Obtained results are similar to those reported by (***Abdel Fattah et al. 1974, Nassar 1986 , Chagas et al .1987 ,El-Sayed 1990*** a, ***Abou El-Hassan et al.1993,Morgan 1993 , El-sayed 1996 ,Singer et al .1996, Mohamed 1997,***and ***Amer et al. .2002)*** all working on common bean cvs.

Table (2): Vegetative growth characteristics of common bean plants as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000						2001					
Cultivars	Fertilization level	Plant height (cm)	No. of leaves/ plant	No. of branches/ plant	L.A /plant (cm2)	Plant F.W (g)	Plant D.W (g)	Plant height (cm)	No. of leaves /plant	No. of branches/ plant	L.A /plant (cm^2)	Plant F.W (g)	Plant D.W (g)
Giza 6		37.18	13.94	4.67	1147.41	79.99	13.70	46.03	15.50	5.16	1068.58	90.99	15.09
Bronco		35.25	12.52	4.14	1208.14	78.97	11.93	43.47	14.59	5.17	1161.88	90.00	12.89
L.S.D at 0.05		0.85	0.62	0.18	n.s.	n.s.	0.82	1.59	n.s.	n.s.	n.s.	n.s.	2.62
	Control	32.02	11.13	3..02	846.19	65.25	11.25	39.95	13.05	3.91	794.94	75.95	10.68
	*Phos.0.5kg/ fed.	34.47	12.07	3.76	980.82	76.00	12.12	42.62	14.50	4.77	888.61	88.25	12.44
	Phos.1kg/ fed.	35.39	12.55	4.06	1074.50	78.00	12.48	43.85	14.71	5.02	1015.00	90.12	13.75
	30kgP_2O_5/ fed.	35.30	13.01	4.39	1134.24	78.75	12.82	43.65	15.22	5.11	1132.70	89.75	13.79
	60kgP_2O_5/ fed.	36.15	13.46	4.68	1170.67	79.87	12.98	45.00	14.38	5.25	1170.90	93.62	14.76
	Phos.0.5kg+30kgP_2O_5/ fed.	35.81	13.72	4.65	1304.78	81.50	13.65	44.33	15.62	5.55	1215.27	92.25	14.88
	Phos.0.5kg+60kgP_2O_5/ fed.	39.37	14.52	5.11	1366.12	86.08	13.31	49.13	16.40	5.91	1285.59	98.75	15.84
	Phos.1kg/fed.+30kgP_2O_5/ fed.	38.84	14.31	5.05	1387.95	84.87	13.27	47.07	15.73	5.32	1284.22	92.25	14.95
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	38.60	14.31	4.93	1334.71	85.00	13.37	47.17	15.81	5.62	1249.84	93.50	14.79
L.S.D at 0.05		1.40	0.61	0.40	110.49	5.14	1.35	1.67	1.13	0.43	155.86	7.11	2.94

*Phos. Phosphorine

Concerning the effect of both phosphorus and phosphorine bio-fertilizer on vegetative growth of bean plants, the same data at Table (2) show clearly that all the studied growth parameters. i.e. plant height, number of leaves and branches, as well as leaf area, fresh and dry weight per plant were positively affected due to the application of both mineral and bio-phosphorus fertilizers compared with the control treatment. In this regard, the application of phosphorus and phosphorine either in a single form at 30 and 60 kg P_2O_5 / fed. for phosphorus and 0.5 and 1 kg / fed. for phosphorine or in combination at 0.5 kg phosphorine + 30 or 60 kg P_2O_5 and 1 kg phosphorine + 30 or 60 kg P_2O_5 /fed. led to a significant increase in all the measured growth aspects of bean plants in comparison with the check treatments. In this connection, the highest values for all recorded morphological characters of plant were obtained as a result of using phosphorine bio-fertilizer at a rate of 0.5 kg / fed. combined with phosphorus fertilizer at 60 kg P_2O_5 / feddan. Obtained results are true during both seasons of study. Such increments in growth of bean plant due to the application of phosphorus and phosphorine may be attributed to the main role of phosphorus in most metabolic process of plant and its connection with energy affluent molecules; (ADP and ATP) in plant cells. In addition, phosphorus application increased the macro-elements content (N, P and K) in different plant parts (Tables 5, 12 and 13) which play the major role in plant growth. Increasing the vegetative growth of plants as a result of phosphorine (PDB) application may be due to the active

bacteria in bio-fertilizer which is capable to transform the tri-calcium phosphate to mono-calcium phosphate in addition to the ability to dissolve soil complex in organic and inorganic phosphate and the role of phosphate bio-fertilizers in increasing availability of soil immobilized phosphorus and consequently increased the content of such element in plant (Table 5). Similar result were reported by (***Mahatanya 1980, El-Gharably*** and ***Abdel-Razek 1982, Manrique (1986), Acuna*** and ***Cordera(1989),Gomaa (1989) , El-Gizy (1990), Janathan*** and ***Emanul 1991, Lynch et al. (1991), Shafshak 1991, Abu El-Hassan et al1993, ,Abdel-Hafez 1994, Fageria et al.(1996)Ali El-din 2000, Shahein et al..(2000a),*** and ***Ismael 2001)***. all working on bean in case of phosphorus ***El-Shamma (2000)***on bean, ***Radwan (1983), Abdel-Moneim et al. (1988a and b), Saber*** and ***Gomaa (1993), Hewedy (1999), Ouda (2000) and Tantawy (2000)*** on tomato and ***Gharib (2001)*** on cucumber in case of phosphorine bio-fertilizer. However, ***El-Bakry et al. (1980)*** on bean, ***Midan et al. (1982)*** on pea, ***Farag et al .(1987)*** on cowpea reported that application of phosphorus fertilizer did not exert any significant effect on plant growth. Contra results were reported by ***Araujo et al .(1982)*** on bean and ***El-Sawah et al. (1985)*** on broad bean, they reported that increasing phosphorus fertilizer levels led to a decrease in vegetative growth of plant.

With regard to the effect of the interaction between the studied cultivars and phosphatic fertilization level on the vegetative growth of plant, data at Table (3) reveal that no

Table (3): Vegetative growth characteristics of common bean plants as affected by the interaction between cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000						2001					
Cultivars	Fertilization level	Plant height (cm)	No. of leaves/ plant	No. of branches/ plant	L.A /plant (cm^2)	Plant F.W (g)	Plant D.W (g)	Plant height (cm)	No. of leaves /plant	No. of branches/ plant	L.A /plant (cm2)	Plant F.W (g)	Plant D.W (g)
Giza 6	Control	33.75	11.73	3.30	800.88	66.50	11.69	42.26	13.53	3.66	781.25	78.66	11.65
	Phos.0.5kg/ fed.	34.75	12.40	4.03	923.85	76.25	13.42	43.18	14.20	4.88	848.42	87.50	13.06
	Phos.1kg/ fed.	36.25	13.05	4.40	1020.66	78.75	13.55	45.10	15.66	5.10	953.19	89.00	14.62
	30kgP_2O_5 / fed.	36.00	13.55	4.75	1098.87	79.50	13.46	44.85	15.40	5.10	1070.77	90.00	14.84
	60kgP_2O_5 / fed.	37.25	14.20	4.95	1123.18	79.50	14.44	46.70	15.70	5.25	1124.61	94.50	16.67
	Phos.0.5kg+30kgP_2O_5/ fed.	36.25	14.60	5.10	1268.99	82.00	14.19	45.43	15.90	5.40	1143.42	92.00	15.65
	Phos.0.5kg+60kgP_2O_5/ fed.	40.75	15.50	5.23	1336.71	86.66	14.14	50.70	16.80	5.85	1197.33	98.75	17.17
	Phos.1kg/fed.+30kgP_2O_5/ fed.	40.00	15.13	5.15	1398.18	85.50	14.46	48.00	16.06	5.50	1273.22	94.50	16.41
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	39.66	15.35	5.13	1355.44	85.25	14.00	48.10	16.30	5.73	1225.04	94.00	15.72
Bronco	Control	30.30	10.53	2.75	891.51	64.00	10.82	37.65	12.58	4.18	808.64	73.25	9.71
	Phos.0.5kg/ fed.	34.19	11.75	3.50	1037.80	75.75	10.83	42.08	14.80	4.68	928.80	89.00	11.82
	Phos.1kg/ fed.	34.53	12.05	3.73	1128.35	77.25	11.43	42.60	13.75	4.95	1076.82	91.25	12.89
	30kgP_2O_5 / fed.	34.61	12.48	4.03	1169.62	78.00	12.32	42.45	15.05	5.13	1194.64	89.50	12.76
	60kgP_2O_5 / fed.	35.05	12.73	4.43	1218.18	80.25	11.53	43.30	13.08	5.25	1217.20	92.75	12.84
	Phos.0.5kg+30kgP_2O_5/ fed.	35.38	12.85	4.20	1340.58	81.00	13.12	43.25	13.35	5.70	1287.12	92.50	14.11
	Phos.0.5kg+60kgP_2O_5/ fed.	38.00	13.55	5.00	1395.55	85.50	12.48	47.58	16.00	5.98	1373.86	98.75	14.51
	Phos.1kg/fed.+30kgP_2O_5/ fed.	37.69	13.50	4.95	1377.78	84.25	12.09	46.15	15.40	5.15	1295.23	90.00	13.48
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	37.55	13.28	4.75	1313.99	84.75	12.75	46.25	15.33	5.53	1274.64	93.00	13.87
L.S.D at 0.05		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

significant differences were found in all studied growth parameters among the studied cultivars due to the application of phosphatic fertilizer at its different used levels either in a mineral or bio form during both the growing seasons of study. However, the highest values in such growth aspects were obtained due to the application of phosphorine fertilizer at 0.5 kg / fed. combined with 60 kg P_2O_5 / fed. in case of Giza 6 cv. obtained results was confirmed during both seasons of study. Obtained results are confirmed with those reported by ***Abou-El- Hassan et al (1993)*** on common bean . Who indicated that the highest values of plant height and plant dry weight were obtained in case of using the highest phosphorus level regardless the cultivars.

4-2- Chemical constituents of plant foliage: -

Table (4) show the effect of cultivars, phosphorus and phosphorine bio-fertilizer on total nitrogen, phosphorus and potassium content of plant foliage.

Concerning the effect of cultivars, of bean plants such data reveal that irrespective of phosphorus content, which was not significantly affected among the tested cvs. during the both seasons of study, total nitrogen and potassium content in plant leaves and stem were significantly differed. In this regard, Boronco cv. reflected the greatest values in the percentage of estimated elements this result was confirmed during both seasons of study. The highest content for cv. Bronco from total nitrogen and potassium was connected with the longer period elapsed from sowing to flowering (Table 6) in case of Bronco compared with cv. Giza 6 such relatively longer duration for vegetative

Table (4): Total nitrogen, phosphorus and potassium contents of bean plant foliage (mg / 100 g dry weight) as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments \ Season		2000						2001					
Cultivars	Fertilization level	Stem			Leaves			Stem			Leaves		
		N	P	K	N	P	K	N	P	K	N	P	K
Giza 6		1390	260	2300	2000	220	2460	1560	270	2330	2070	240	2490
Bronco		1660	250	2620	2300	230	2610	1690	270	2650	2280	240	2620
L.S.D at 0.05		90	n.s.	40	150	n.s.	0.90	90	n.s.	30	200	n.s.	80
	Control	1230	210	1950	1430	170	2060	1270	210	1970	1410	190	2050
	Phos.0.5kg/ fed.	1260	220	2010	1550	190	2240	1350	220	2050	1530	210	2260
	Phos.1kg/ fed.	1420	230	2120	1690	210	2380	1510	240	2120	1650	220	2400
	30kgP_2O_5/ fed.	1430	230	2230	1930	210	2430	1580	240	2240	1970	230	2400
	60kgP_2O_5/ fed.	1580	250	2490	2010	230	2520	1720	260	2540	2050	240	2560
	Phos.0.5kg+30kgP_2O_5/ fed.	1650	270	2660	2600	240	2670	1760	290	2730	2730	260	2640
	Phos.0.5kg+60kgP_2O_5/ fed.	1670	310	2780	2730	270	2770	1770	330	2840	2760	280	2790
	Phos.1kg/fed.+30kgP_2O_5/ fed.	1720	300	2920	2690	250	2860	1810	310	2960	2650	260	2890
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	1800	290	2970	2740	250	2910	1840	300	2990	2830	260	2910
L.S.D at 0.05		80	30	70	120	20	100	90	20	70	90	20	70

growth phase permit the plant to absorb more amounts of such elements. Obtained results are in agreement with those reported by ***Ahlawat (1996),El-sayed (1990 b) ,and Hernandez et al. (1996)*** all working on common bean.

Refering to the effect of phosphatic fertilization on the concentration of N, P and K in plant foliage, the same data in Table (4) show clearly that the content of such attributes (N.P.K) was significantly increased as a result of the application of phosphatic fertilizer as mineral form or bio-fertilizer. In this respect, application of phosphatic fertilizer at rate of 0.5 or 1 /kg / fed. as phosphorine and 30 or 60 kg P_2O_5 / fed. either solely or in combination i.e 0.5 kg phosphorine plus 30 or 60 kg P_2O_5 / fed. and 1 kg phosphorine plus 30 or 60 kg P_2O_5 /fed. significantly increased all estimated macro elements in plant foliage compared with the control treatment. In addition the highest nitrogen and potassium content was connected with the highest used level of phosphorine and phosphorus in combination form (1 kg + 60 kg P_2O_5 / fed.) while the highest phosphorus content was obtained as a result of using 0.5 kg P.D.B + 60 kg P_2O_5 /fed. this trend was noticed during both seasons of study. Such increment in all estimated macro-elements was connected with the increase in vegetative growth parameters (Table 2) as a result of phosphorus application. Obtained results may be due to the role of phosphorus and phosphorine fertilizer on proliferation of roots and consequently increased the absorption ability of bean plants. Similar results were reported by ***Chavez et al.(1977), Palaniyandi*** and ***Smith***

(1978), El-Bakry et al. (1980) ,Singh et al .(1981), Awad et al .(1982), El-Garably and *AbdEl- Razik (1982)*and,*Maek (1983) Abd El-Hafez (1994)* and *Shahein et al. (2000a) all* working on bean and *El-Sawah et al. (1985)* on broad bean in addition *Ismaiel (2001)* showed that increasing phosphorus fertilizer level from 0 up to 32 kg P_2O_5 / fed. led to a significant increased N, P and K percentage and up take for leaves and stems of common bean plant. Moreover, *El-Shamma (2000)* on bean and *Tantawy (2000)*on tomato and *Garib (2001)* on cucumber reported that application of bio-fertilizers increased N, P , K and protein content of such plants. of *Kerlous et al .(1998)* on cowpea

On the other hand contra results were obtained by **Smith** *(1977) Midan et al. .(1980)* all working on bean *Moursy et al. (1970) Ahmed (1975)* working on broad bean, *Fayad (1997)* on common bean.

As for the interaction effect, data at Table (5) indicate that irrespective of phosphorus content in different plant parts (stem and. leaves) which was not significantly affected as a result of the interaction, nitrogen and potassium content in plant foliage (stem & leaves) for both cultivars i.e Bronco and Giza 6 was increased as a result of fertilization with phosphorus and/or phosphorine at different used levels compared with the control treatment during the two seasons of study. Moreover, the highest content of nitrogen, phosphorus and potassium was connected with the highest used level of phosphorine and phosphorus fertilizer in combination form i.e. 1 kg phosphorine + 60 kg P_2O_5 / fed. in this respect *Ssali and Keya (1983)* indicated that,

Table (5): Total nitrogen, phosphorus and potassium contents of bean plant foliage (mg / 100 g dry weight) as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000						2001					
		Stem			Leaves			Stem			Leaves		
Cultivars	Fertilization level	N	P	K	N	P	K	N	P	K	N	P	K
Giza 6	Control	1210	230	1750	1220	190	1950	1290	220	1760	1180	200	1950
	Phos.0.5kg/ fed.	1250	230	1860	1240	200	1240	1400	230	1890	1240	220	2170
	Phos.1kg/ fed.	1270	240	1890	1430	220	2330	1460	250	1900	1410	240	2340
	30kgP_2O_5/ fed.	1330	230	2080	1870	220	2380	1600	250	2080	1960	240	2440
	60kgP_2O_5/ fed.	1380	240	2260	1970	230	2550	1620	260	2370	2030	250	2580
	Phos.0.5kg+30kgP_2O_5/ fed.	1500	260	2440	2580	240	2590	1660	280	2490	2760	260	2640
	Phos.0.5kg+60kgP_2O_5/ fed.	1520	330	2650	2610	270	2620	1660	340	2690	2800	280	2640
	Phos.1kg/fed.+30kgP_2O_5/ fed.	1440	310	2860	2430	250	2790	1650	310	2920	2440	260	2820
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	1670	310	2950	2690	250	2860	1720	310	2950	2850	260	2850
Bronco	Control	1250	210	2150	1650	170	2190	1260	210	2180	1650	180	2150
	Phos.0.5kg/ fed.	1280	210	2170	1870	200	2340	1310	220	2210	1840	210	2350
	Phos.1kg/ fed.	1570	220	2360	1950	210	2450	1560	230	2350	1890	220	2460
	30kgP_2O_5/ fed.	1520	230	2390	1990	220	2490	1570	250	2410	1980	230	2530
	60kgP_2O_5/ fed.	1790	270	2730	2060	230	2490	1840	270	2710	2090	240	2550
	Phos.0.5kg+30kgP_2O_5/ fed.	1820	290	2900	2620	250	2760	1870	300	2980	2700	260	2650
	Phos.0.5kg+60kgP_2O_5/ fed.	1830	310	2930	2850	290	2930	1880	330	3000	2720	300	2950
	Phos.1kg/fed.+30kgP_2O_5/ fed.	2020	300	2980	2950	270	2930	1980	310	3020	2870	280	2970
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	1930	290	3010	2790	260	2970	1970	310	3050	2810	270	2980
L.S.D at 0.05		110	n.s.	10	170	n.s.	n.s.	110	n.s.	90	120	n.s.	100

application increased phosphorus uptake and tissue nitrogen of studied *Phaseolus vulgaris* cvs. ***Ahlawat (1996)*** reached to similar results.

4-3- Flowering characteristics: -

Data in Table (6) show the effect of cultivars, phosphorus and phosphorine fertilizer on flowering characteristics of cvs. Giza 6 and Bronco expressed as number of days elapsed to the flowering of 50% of plants, number of flowers and pods produced by plant as well as pods setting percentage.

Regarding the effect of cultivars, such data reveal that there were a significant differences between the used cultivars in flower in earlier number of flowers and pods as well as fruit setting percentage during the two seasons of study. In this respect, cv. Giza 6 was earlier in flowering than Bronco. However, cv. Bronco was superior in number of flowers and pods / plant as well as setting percentage compared with Giza 6 during both seasons of study. Moreover, the number of days elapsed from seeding to 50 % flowering plants was 42.65 and 49.69, 24.80 and 49.43 days during first and second seasons for cvs. Giza 6 and Bronco respectively. Obtained results are similar to those reported by ***Abdel-Fattah et al. (1974), Abou El-Hassan et al. (1993)*** and ***Mohamed (1997)*** all working on common bean, they reported that there were a differences among cultivars in the number of days elapsed from sowing to flowering. Such variation in the number of days from seeding to flowering among cultivars would be related to the accumulation heat unit.

Table (6): Flowering characteristics of common bean plants as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000				2001			
Cultivars	Fertilization level	No. of days	No. of flowering / plant	No. of pods /plant	Setting percentage	No. of days	No. of flowering / plant	No. of pods /plant	Setting percentage
Giza 6		42.65	38.84	18.61	47.76	42.80	40.58	17.48	42.43
Bronco		49.69	47.14	30.12	63.85	49.43	46.89	30.87	65.82
L.S.D at 0.05		0.78	1.02	1.58	5.55	0.56	0.91	2.62	6.77
	Control	49.25	38.95	20.00	50.58	50.00	40.38	20.62	49.71
	Phos.0.5kg/ fed.	48.50	40.13	21.88	53.55	48.42	41.63	21.38	50.97
	Phos.1kg/ fed.	47.25	41.63	22.50	53.11	47.42	42.00	21.63	50.97
	30kgP_2O_5/ fed.	46.25	42.38	23.13	53.73	47.08	43.25	22.25	50.80
	60kgP_2O_5/ fed.	45.83	43.88	23.50	52.73	45.83	44.13	22.75	80.86
	Phos.0.5kg+30kgP_2O_5/ fed.	45.25	43.75	25.25	57.27	45.00	44.38	24.63	54.92
	Phos.0.5kg+60kgP_2O_5/ fed.	43.75	45.88	28.54	61.67	43.25	46.38	30.91	65.72
	Phos.1kg/fed.+30kgP_2O_5/ fed.	44.58	45.13	27.50	60.15	43.92	46.00	26.75	57.05
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	44.83	45.25	27.00	59.24	44.08	45.50	26.91	58.63
L.S.D at 0.05		0.97	1.73	0.253	5.72	1.17	1.83	2.64	6.86

Concerning the effect of phosphorus and phosphorine fertilizers the same data at Table (6) indicate that application of phosphatic fertilizer at its different used levels i.e. at 0.5 and 1 kg / fed. in case of phosphorine, 30 and 60 kg P_2O_5 / fed. in case of phosphorus either in a single form or in combination steadily decreased the number of days form sowing up to the flowering of 50% of the plant. On the other hand, it increased number of flower and pods per plant as well as fruits setting percentage during both seasons of growth compared with the control treatment. In this connection, the least number of days, the highest number of flowers, pods and setting percentage were resulted due to the application of phosphatic fertilizers in commination form compared with using it in solely form. Moreover, phosphorine at 0.5 kg combined with 60 kg P_2O_5 reflected the highest values in number of flowers, pods as well as setting percentage and the lowest values for number of days from seeds sowing up to the flowering of 50% of plants The same trend was obtained during both seasons of study such results may be due to the main role of phosphorus in flowering and fruit setting of plant. Such results are in agreement with those reported by ***Sa-Me et al. (1982), Alvino et al.(1988) ,Pedroza (1994)*** and ***El-Shamma et al. (2000)***. In addition, ***El-Shamma et al. (2000)*** indicated that calcium superphosphate stimulated the production of fruit via its effect on increasing total number of flowers produced per plant and /or the increase in percentage of fruit setting.

Table (7): Flowering date and impregnate ratio as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000				2001			
Cultivars	Fertilization level	No. of days	No. of flowering / plant	No. of pods /plant	Setting percentage	No. of days	No. of flowering / plant	No. of pods /plant	Setting percentage
Giza 6	Control	45.00	35.60	14.75	41.55	45.50	38.25	13.50	35.29
	Phos.0.5kg/ fed.	44.00	36.25	15.00	41.36	44.50	40.25	14.75	36.67
	Phos.1kg/ fed.	43.50	37.25	16.00	43.09	43.50	40.25	15.25	37.88
	30kgP_2O_5/ fed.	43.00	37.50	17.25	46.01	43.50	40.75	15.75	38.76
	60kgP_2O_5/ fed.	42.60	40.00	17.50	44.00	42.30	40.75	16.50	40.41
	Phos.0.5kg+30kgP_2O_5/ fed.	42.00	40.00	20.25	50.81	42.00	40.50	19.25	47.57
	Phos.0.5kg+60kgP_2O_5/ fed.	40.50	41.50	22.75	54.90	41.00	42.27	22.33	52.91
	Phos.1kg/fed. + 30kgP_2O_5/ fed.	41.50	40.25	22.00	54.63	41.30	41.25	19.50	47.31
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	41.60	41.25	22.00	53.48	41.50	41.00	20.50	50.03
Bronco	Control	53.50	42.30	25.25	59.60	54.50	42.50	27.25	64.13
	Phos.0.5kg/ fed.	53.00	44.00	28.75	65.73	52.30	43.00	28.00	65.27
	Phos.1kg/ fed.	51.00	46.00	29.00	63.12	51.30	43.75	28.00	64.05
	30kgP_2O_5/ fed.	49.50	47.25	29.00	61.45	50.60	45.75	28.75	62.84
	60kgP_2O_5/ fed.	49.00	47.75	29.50	61.97	49.30	47.50	29.00	61.30
	Phos.0.5kg+30kgP_2O_5/ fed.	48.50	47.50	30.25	63.72	48.00	48.25	30.00	62.26
	Phos.0.5kg+60kgP_2O_5/ fed.	47.00	50.25	34.33	68.44	45.50	50.50	39.50	78.53
	Phos.1kg/fed.+30kgP_2O_5/ fed.	47.60	50.00	33.00	65.66	46.50	50.75	34.00	66.78
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	48.00	49.25	32.00	65.00	46.60	50.00	33.33	67.23
L.S.D at 0.05		1.38	n.s.	n.s.	n.s.	1.66	n.s.	n.s.	n.s.

As for the effect of the interaction, data presented in Table (7) show clearly that regardless number of days elapsed from seed sowing up to the flowering of 50 % of plants which were significantly decreased as results of the interaction, no significant differences were matched in the other studied flowering parameters. i.e. number of flowers and pods as well as setting percentage due to the interaction effect between the studied cultivars and phosphatic fertilizer during both seasons of growth.

4-4-Green pods yield and its components :-

Data presented in Table (8) show the effect of s, phosphorus and phosphorine fertilizers as well as their combination on total green pods yield and its components expressed as average pod length, diameter and weight as well as pods yield / plant and feddan..

Concerning the effect of cultivar, such data show clearly that, there was a difference in all studied yield parameter between Giza 6 and Bronco cvs. during both seasons of growth. In this regard such differences failed to reach the level of significancy in case of the average pod length during both seasons of study and yield of green pods per plant while cv. Bronco was superior in case of green pods yield either for plant or feddan during both seasons of growth The superiority of cv. Bronco in and feddan in case of the second season. Moreover, cv. Giza 6 showed higher values for average green pod parameters (diameter and weight) both green pods yield per

Table (8): Total green pods yield and its components as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments \ Season		2000					2001				
Cultivars	Fertilization level	Average green pod			Pods yield /plant (g)	Pods yield / fed. (kg)	Average green pod			Pods yield /plant (g)	Pods yield / fed. (kg)
		Length (cm)	Diameter (cm)	Weight (g)			Length (cm)	Diameter (cm)	Weight (g)		
Giza 6		11.73	1.20	10.80	189.00	5593	12.39	1.25	10.77	198.38	5922
Bronco		11.86	0.88	8.02	238.68	7255	12.34	0.90	7.17	202.76	6037
L.S.D at 0.05		n.s.	0.04	0.29	10.71	373	n.s.	0.05	0.67	n.s.	n.s.
	Control	10.09	0.94	8.19	160.18	4802	10.64	0.99	7.22	165.50	4709
	Phos.0.5kg/ fed.	11.02	1.00	9.01	180.47	5414	11.64	1.03	7.98	174.45	5233
	Phos.1kg/ fed.	11.32	1.02	9.05	202.37	6017	11.85	1.06	8.60	186.45	5593
	$30kgP_2O_5$ / fed.	11.68	1.03	9.18	204.80	6144	12.08	1.06	8.76	193.37	5846
	$60kgP_2O_5$ / fed.	11.90	1.07	9.60	210.87	6326	12.32	1.10	8.91	196.51	5895
	Phos.0.5kg + $30kgP_2O_5$/ fed.	12.33	1.07	9.77	227.38	6822	12.75	1.10	9.25	212.27	6368
	Phos.0.5kg + $60kgP_2O_5$/ fed.	12.77	1.11	10.21	260.26	7703	13.74	1.13	10.56	237.16	7112
	Phos.1kg/fed. + $30kgP_2O_5$/ fed.	12.43	1.09	9.93	237.38	7252	13.18	1.09	9.54	217.91	6509
	Phos.1kg/ fed. + $60kgP_2O_5$/ fed.	12.61	1.09	10.06	241.80	7282	13.08	1.10	9.94	221.49	6550
L.S.D at 0.05		0.47	0.04	n.s.	27.36	796	0.78	0.05	1.12	27.82	807

plant and feddan was connected with, the highest number of green pods produced per plant Table (6) and higher, chemical content of assayed macro-elements Table (4) which play the mean role in plant growth and its productivity. Obtained results are a griment with those reported by ***Abd El-Fattah et al .(1974), Nassar (1986), El-Sayed (1990*** a) , ***Roy and Parthasarathy (1999) and Amer et al .(2002)*** all working on bean .

Regarding the effect of phosphatic fertilizers on total green pods yield and its components, the same data in Table (8) reveal that application of phosphatic fertilizers i.e phosphorus at 30 and 60 kg P_2O_5 /fed. and phosphorine at 0.5 and 1 kg /fed, either in a single form or in combination

significantly increased total green pods yield and its components expressed as average pod length, diameter and weight as well as green pods yield per plant and feddan compared with the control treatment during both seasons of growth. Obtained results show that common bean plants positively responded application to the application. of phosphatic fertilizer in its two forms .i.e. mineral and bio form. In addition, application of phosphorine combined with phosphorus fertilizer at its different used levels increased the total produced green pods yield and its components compared with using phosphorine or phosphorus solely and the control. In this respect using phosphorine at 0.5 kg combined with 60 kg P_2O_5 /fed. led to the highest increments in all studied yield parameters followed by application of phosphorine at 1 kg plus 60 kg P_2O_5 /fed. and phosphorine at 1 kg plus 30 kg P_2O_5 / fed. This result was confirmed during both seasons of study such

increment effect of phosphorine and/or phosphorus application on yield and its components was due to the enhancing effect on vegetative growth Table (2) and increasing the macro-nutrient (N P K) content of plant foliage Table (3) which judging the productivity of plants. Also such increasing effect of phosphatic fertilizers addition may be attributed to the main role of phosphorus on flowering and fruit yield of plant. Similar results were reported by ***Awad et al. (1982), Browing et al. (1983), El-Gizy (1990), Abou El-Hassan et al. (1993), Roy and Parthasarathy (1999), El-Shamma et al. (2000) and Singer et al. (2000)*** all working on common bean, ***Chamberland (1982) and Midan et al. (1982)*** *on pea and* ***El-Nekhlawy et al .(1988), Shafik et al. (1988), Shahein (1991)*** and ***Shahein et al.(1995)*** on faba bean They reported that P is of a great importance on productivity of yield. In this regard ***Abou El-Hassan et al. (1993)*** reported that the green yield for Morgan, cvs. Giza 3 and Giza 6 was increased with increasing phosphorus application from 0 up to 60 kg P_2O_5 / feddan.

As for the effect of combination between used cultivars and phosphatic fertilizer, data illustrated at Table (9) show clearly , that, there were no significant differences in total green pods yield and its parameters of both cvs. Giza 6 and Bronco due to the application of phosphatic fertilizers at different used levels either in a single form or in combination during the two seasons of growth. However the highest produced green pods yield and its parameters for both varieties were obtained as a result of using phosphorine at 0.5 kg combined with 60 kg P_2O_5/

Table (9): Total green pods yield and its components as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments \ Season		2000					2001				
		Average green pod			Pods yield /plant (g)	Pods yield / fed. (kg)	Average green pod			Pods yield /plant (g)	Pods yield / fed. (kg)
Cultivars	Fertilization level	Length (cm)	Diameter (cm)	Weight (g)			Length (cm)	Diameter (em)	Weight (g)		
Giza 6	Control	10.28	1.09	9.15	135.34	3664	11.10	1.15	8.78	165.49	4703
	Phos.0.5kg/ fed.	11.08	1.14	10.49	157.25	4718	11.92	1.18	9.21	168.20	5046
	Phos.1kg/ fed.	11.11	1.17	10.32	178.88	5366	11.97	1.22	10.53	186.80	5604
	30kgP_2O_5 / fed.	11.57	1.19	10.47	180.40	5412	12.21	1.23	10.87	192.04	5761
	60kgP_2O_5 / fed.	11.68	1.23	11.19	188.81	5664	12.35	1.28	10.94	194.09	5823
	Phos.0.5kg + 30kgP_2O_5/ fed.	12.36	1.24	10.82	198.85	5966	12.90	1.28	11.22	210.21	6306
	Phos.0.5kg + 60kgP_2O_5/ fed.	12.80	1.28	10.65	232.20	6757	13.45	1.32	12.04	237.00	7110
	Phos.1kg/fed. + 30kgP_2O_5/ fed.	12.17	1.26	11.69	212.98	6389	12.72	1.29	11.50	215.38	6461
	Phos.1kg/ fed. + 60kgP_2O_5/ fed.	12.54	1.27	11.46	218.29	6402	12.92	1.31	11.84	216.21	6486
Bronco	Control	9.90	0.80	2.24	185.02	5940	10.19	0.84	5.66	165.51	4715
	Phos.0.5kg/ fed.	10.97	0.87	7.53	203.71	6111	11.36	0.90	6.75	180.68	5420
	Phos.1kg/ fed.	11.55	0.87	7.78	225.88	6776	11.74	0.91	6.67	186.09	5583
	30kgP_2O_5 / fed.	11.79	0.88	7.89	229.21	6876	11.95	0.90	6.66	194.69	5931
	60kgP_2O_5 / fed.	12.13	0.91	8.02	232.93	6988	12.29	0.93	6.89	198.97	5969
	Phos.0.5kg + 30kgP_2O_5/ fed.	12.31	0.91	8.11	255.95	7678	12.60	0.93	7.28	214.33	6430
	Phos.0.5kg + 60kgP_2O_5/ fed.	12.74	0.93	8.77	288.31	8649	14.04	0.95	9.03	237.33	7115
	Phos.1kg/fed. + 30kgP_2O_5/ fed.	12.70	0.91	8.16	261.82	8115	13.64	0.90	7.58	220.44	6558
	Phos.1kg/ fed. + 60kgP_2O_5/ fed.	12.69	0.91	8.67	265.30	8163	13.24	0.90	8.04	226.78	6615
L.S.D at 0.05		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

fed. Such trend was true during both seasons of study. In this concern, ***Abou El-Hassan et al. (1993)*** found that the highest green yield was obtained in case of cv. Giza 3 and application of 60 kg P_2O_5 / feddan. In addition ***Roy*** and ***Parthasarathy (1999)*** found that the heights yield (7.96 t/ha.) was obtained with 120 kg P in case of cv.Tender crop it could be concluded that phosphorine at 0.5 kg combined with 60 kg P_2O_5 / fed. was recommended for higher green pods yield with best quality under such condition of study.

4-5-Dry seed yield and its components-:

Data presented in Table (10) show the effect of cultivars and phosphorus as well as phosphorine on dry seed yield and its components expressed as number of seeds per pod, seed yield per plant and total yield per fed.

Concerning the effect of varieties such data show clearly that, irrespective of the average number of seeds per pod which was significantly affected, both the produced yield per plant or feedan did not show any significant differences between varieties under study (Giza 6 and Bronco) during the two seasons of growth. In this concept. cv. Bronco shows the highest number of seeds per pods compared with cv. Giza 6 during both seasons of study. Such character was genetic one and was not affected by agricultural treatments. Even though the number of seeds per pod and the number of pod per plant (Table 10 and 6) of cv.Giza 6 was less than that of cv. Bronco, the total produced dry seed yield either or plant or feddan was almost the same this is due to

Table (10): Total dry seed yield as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments \ Season		2000			2001		
Cultivars	Fertilization level	No. of seeds/ pod	Seed yield / plant (g)	Seed yield / fed. (kg)	No. of seeds/ pod	Seed yield / plant (g)	Seed yield / fed. (kg)
Giza 6		3.97	22.98	920.44	4.34	22.73	933.61
Bronco		4.60	21.89	839.74	6.29	22.65	920.34
L.S.D at 0.05		0.09	n.s.	n.s.	0.26	n.s.	n.s.
	Control	3.30	16.14	625.99	4.05	16.44	667.25
	Phos.0.5kg/ fed.	3.81	19.12	760.83	4.87	19.63	782.84
	Phos.1kg/ fed.	3.95	19.53	777.20	5.11	20.36	849.12
	30kgP_2O_5/ fed.	4.13	23.23	866.14	5.18	22.60	928.25
	60kgP_2O_5/ fed.	4.17	24.10	935.01	5.25	23.73	951.72
	Phos.0.5kg+30kgP_2O_5/ fed.	4.25	24.42	947.75	5.37	24.15	1007.30
	Phos.0.5kg+60kgP_2O_5/ fed.	5.03	25.63	1016.84	6.03	26.32	1031.62
	Phos.1kg/fed.+30kgP_2O_5/ fed.	4.96	24.68	993.07	5.86	25.35	1058.76
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	4.97	25.07	998.00	6.15	25.65	1055.89
L.S.D at 0.05		0.39	2.64	126.65	0.48	2.86	87.46

the large seed index of cultivar Giza 6 comparing to cultivar Bronco during the seasons of study Similar results were reported by. ***Vidal et al. (1982), Ahlawat*** and ***Sharam(1989),Abou El-Hassan et al.(1993) and Ahlawat (1996)*** all working on beans.

As for the effect of fertilization, the same data at Table (10) indicate that the total produced seed yield and its components i.e. number of seeds per pod, seed yield per plant or feddan was significantly increased due to

phosphatic fertilizer application at different used levels either in the form of phosphorus or phosphorine compared with the control treatment. Obtained results were true during both seasons of study. In addition, using phosphorine and phosphorus in combination increased total produced seed yield and its components compared with using each of them in single form. In this regard. phosphorine at 0.5 kg / fed. combined with 60 kg P_2O_5 /fed. and 1 kg / fed. combined with 30 or 60 kg P_2O_5 /fed. reflected the highest total produced seed yield and its components during both seasons of study. However, no significant differences could be noticed between such treatments. Obtained results were connected with the effect of such treatments on the vegetative growth of plant Table (2) and flowering ability (Table 6) which reflected on the productivity of plant. In this respect, it could be concluded that, phosphorine at 1 kg plus the addition of 30-kg P_2O_5 / fed. could be recommended for higher seed yield production under such condition. Obtained results are confirmed with those reported by ***Mahatanya (1980),Semu et al. (1982), Vidal et al. (1982), Frizzon et al.***

Table (11): Total dry seed yield as affected by cultivars, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000			2001		
Cultivars	Fertilization level	No. of seeds/ pod	Seed yield / plant (g)	Seed yield / fed. (kg)	No. of seeds/ pod	Seed yield / plant (g)	Seed yield / fed. (kg)
Giza 6	Control	2.83	16.13	668.49	3.23	16.08	700.89
	Phos.0.5kg/ fed.	3.50	20.14	824.28	3.90	19.92	806.26
	Phos.1kg/ fed.	3.53	20.82	857.30	4.13	20.56	840.71
	30kgP_2O_5/ fed.	3.88	23.30	862.42	4.20	22.57	944.34
	60kgP_2O_5/ fed.	4.05	24.62	980.92	4.30	24.05	977.00
	Phos.0.5kg+30kgP_2O_5/ fed.	4.10	25.00	1013.22	4.38	24.78	981.98
	Phos.0.5kg+60kgP_2O_5/ fed.	4.68	26.36	1019.86	5.10	25.89	1019.31
	Phos.1kg/fed. + 30kgP_2O_5/ fed.	4.63	24.93	1025.42	4.90	25.16	1068.08
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	4.59	25.58	1032.08	5.00	25.59	1064.60
Bronco	Control	3.78	16.15	583.49	4.88	16.81	633.63
	Phos.0.5kg/ fed.	4.14	18.12	697.39	5.85	19.33	759.43
	Phos.1kg/ fed.	4.38	18.24	797.11	6.10	20.16	857.53
	30kgP_2O_5/ fed.	4.40	23.17	869.88	6.18	22.65	912.16
	60kgP_2O_5/ fed.	4.30	23.59	889.11	6.20	23.43	926.45
	Phos.0.5kg+30kgP_2O_5/ fed.	4.40	22.84	882.28	6.38	23.54	1033.13
	Phos.0.5kg+60kgP_2O_5/ fed.	5.40	24.92	1013.78	6.96	26.76	1043.93
	Phos.1kg/fed.+30kgP_2O_5/ fed.	5.31	24.43	960.73	6.85	25.54	1049.45
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	5.36	24.55	963.92	7.30	25.71	1067.38
L.S.D at 0.05		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

(1982),Thung et al. 1982 ,Gallo (1984) Les and Stam (1984), Selim et al. ((1986) ,Prabhakar et al. (1986),Alt (1987) Ahlawat and *Sharmma (1989), El-Sayed (1990* a*), Otabbong et al. (1991), Abo-El-Hassan et al. (1993),Simthon et al .(1993), Ahlawat (1996), Abd El-Hafez (1994) El-Shamma (1998) El-Shamma et al. (2000) and Ismael (2001)* all working on common bea and *Kamel (1994)* on cowpea .

Regarding the effect of the interaction between the used cultivars andphosphatic fertilizers application Table (11) showed that, no significant differences were obtained ,in total dry seed yield and its components due to the interaction during both seasons of growth. However the highest values of produced yield in both studied cultivars was obtained due to the application of 1 kg phosphorine combined with 30 or 60 kg P_2O_5 / feddan.

4- 6- Chemical constituents of seeds.

A- Minerals constituents : -

Data at table (12) show the effect of cultivars, phosphorus and phosphorine on total nitrogen, phosphorus and potassium content of produced dry seeds.

As for the effect of cultivars such data indicate that estimated -macro-elements i.e-total nitrogen, phosphorus and potassium were significantly differ among the studied cultivars i.e. cvs. Giza 6 and Bronco during both growing seasons. In this respect the highest values in all determined macro-elements were obtained in case of cv. Bronco the same trend was true in the two seasons of study. The higher mineral content in case of cv.

Table (12): Chemical constituents of dry seeds as affected by variety, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Season / Treatments		2000						2001					
		N	P	K	Sugars			N	P	K	Sugars		
Cultivar	Fertilization level	Mg / 100 g. D.W.			Soluble (%)	Non Soluble (%)	Total (%)	Mg / 100 g. D.W.			Soluble (%)	Non Soluble (%)	Total (%)
Giza 6		2570	490	1470	2.18	10.06	13.23	2660	500	1490	3.23	10.08	13.31
Bronco		2600	550	1490	2.95	10.31	13.26	2620	550	1520	2.99	10.58	13.57
L.S.D. at 0.05		240	20	40	0.02	0.14	n.s	70	30	10	0.05	0.13	0.13
	Control	1880	430	1150	2.43	8.54	10.97	1880	430	1180	2.53	8.67	11.20
	Phos.0.5kg/ fed.	2150	440	1230	2.58	9.35	11.93	2170	450	1240	2.65	9.52	12.17
	Phos.1kg/ fed.	2360	480	1400	2.74	9.95	12.69	2480	480	1410	2.77	10.02	12.79
	30kgP_2O_5 / fed.	2160	520	1450	2.89	10.23	13.12	2660	520	1510	2.95	10.34	13.29
	60kgP_2O_5 / fed.	2640	530	1490	3.13	10.37	13.50	2750	540	1520	3.08	10.59	13.67
	Phos.0.5kg+30kgP_2O_5/ fed.	2740	550	1570	3.27	10.52	13.79	2820	570	1620	3.13	10.66	13.79
	Phos.0.5kg+60kgP_2O_5/ fed.	2940	600	1640	3.43	10.73	14.16	2980	610	1660	3.44	10.82	14.26
	Phos.1kg/fed.+30kgP_2O_5/ fed.	2950	590	1690	3.51	10.90	14.41	3010	560	1680	3.55	11.05	14.60
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	2990	580	1730	3.61	11.05	14.66	3030	570	1700	3.73	11.25	14.98
L.S.D at 0.05		110	20	40	0.09	0.25	0.23	90	30	40	0.11	0.30	0.25

Bronco was connected with the higher vegetative growth compared with cv. Giza 6 (Table 2 &3). However, ***Mohamed et al. (1999)*** working on three cvs. cowpea, showed that no significant differences were observed among the studied cultivars in NPK content of produced seeds.

With regard to the effect of phosphorus and phosphorine fertilizer, the same data at Table (12) show clearly that application of phosphorus or phosphorine at different used levels either in a single form or in combination significantly increased the total nitrogen, phosphorus and potassium content of the produced seeds compared with the check treatment. In this regard application of phosphatic fertilizers in combination positively affected the content of seeds from determined macro-elements compared with using such fertilizer in a single form. In this respect, the highest N and K content was obtained as a result of the highest used level of phosphorine and phosphorus fertilizer .i.e. 1 kg phosphorine + 60 kg P_2O_5 / fed. but the highest content of P was recorded as a result of application of 0.5 kg phosphorine plus 60 kg P_2O_5 /fed. Such results are true during the two seasons of trail. Obtained results may due to the synergistic effect of phosphorus in increasing the absorption of nitrogen and potassium element by plant. Such results are agree with those found by ***Aulaks*** and ***Pasricha (1977), Peck et al. (1980), Lauer (1982), Eid (1991), Shafshak (1991) Abd El-Hafez (1994), El-Shamma(2000)*** and ***Ismael (2001)*** all working on bean mentioned that increasing phosphorus fertilizer level increased N, P and K content for the produced seeds Moreover,

Shamma (2000) on bean indicated that addition of phosphorus or phosphorine; in addition; Rhizobium increased N and P content of produced seeds. On the other hand, ***Midan et al. (1980), Vieria (1986)*** reported contra results

Concerning the effect of the interaction data recorded at Table (13) indicate that total nitrogen, phosphorus and potassium content of the produced seeds was steadily increased as a result of phosphatic fertilizers

uring the two seasons of growth. Such increments failed to reach the level of significancy during the first season only in case of total nitrogen and potassium. In addition the highest values of such macro-element were obtained due to the application of phosphorine at 0.5 kg plus 60 kg P_2O_5/fed. in case of phosphorus .and 1 kg phosphorine plus 60 kg P_2O_5 / fed. in case of total nitrogen as well as potassium.

B- sugars constituents:-

Data presented in Table (12) indicate the content of reducing, non-reducing and total sugars as affected by cultivars, phosphorine and phosphorus fertilizer.

Concerning the effect of cultivars, it is clear from data in Table (12) that there were a significant differences in assayed sugars reducing, non reducing and total sugars content between the cultivated cvs. In this regard , seeds of cv Bronco contained more total and non-reducing sugars compared with cv Giza 6 during both seasons of growth. On the other hand seeds of cv Giza 6 exceeded that of Bronco in reducing sugars, These results

were true during the two season of growth. Such results are in agreement with those reported by ***Abdalla et al .(1976)*** and ***El-Sayed (1990*** b*)* who found that sugars content differ among the studied cvs.

With regard to the effect of phosphatic fertilizers, the same data at Table (12) show that application of phosphatic fertilizers, phosphorine and phosphorus at different used levels either in a single form or in combination steadily and significantly increased all determined sugars fraction's in produced seeds compared with the control treatments during both seasons of study. In this respect, the highest sugars content was obtained in case of the application of the highest fertilizer level. i.e. 1 kg phosphorine plus 60 kg P_2O_5 / fed. This trend was true during the two seasons of trials. Such results may be due to the main role of phosphorus in carbohydrates deposition and plant metabolism.

Concerning the interaction effect between cultivated cvs. and phosphatic fertilizer data in Table (13) reveal that reducing , non reducing and total sugars content of the produced dry seeds were positively affected due to the interaction between cultivars and phosphatic fertilizers. In this regard, the highest sugars content was reported due to the highest fertilizer level; 1 kg of phosphorine plus 60 kg P_2O_5 / fed. in case of the seeds of both studied cvs. during the two seasons of study .

Table (13): Chemical constituents of dry seeds as affected by variety, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000						2001					
		N	P	K	Sugars			N	P	K	Sugars		
Cultivar	Fertilization level	Mg / 100 g. D.W.			Soluble (%)	Non Soluble (%)	Total (%)	Mg / 100 g. D.W.			Soluble (%)	Non Soluble (%)	Total (%)
Giza 6	Control	1870	410	1180	2.51	8.30	10.81	1860	420	1200	2.62	8.39	10.92
	Phos.0.5kg/ fed.	2200	430	1200	2.61	8.92	11.53	2200	440	1210	2.68	9.01	11.69
	Phos.1kg/ fed.	2350	490	1380	2.81	9.76	12.57	2460	500	1330	2.86	9.51	12.37
	30kgP_2O_5/ fed.	2700	490	1440	3.02	10.16	13.18	2770	520	1470	3.00	10.08	13.08
	60kgP_2O_5/ fed.	2720	500	1640	3.32	10.26	13.58	2900	520	1480	2.26	10.36	13.62
	Phos.0.5kg+30kgP_2O_5/ fed.	2870	520	1750	3.46	10.44	13.90	2950	550	1630	3.52	10.47	13.99
	Phos.0.5kg+60kgP_2O_5/ fed.	2800	560	1660	3.54	10.74	14.28	2940	570	1670	3.65	10.74	14.39
	Phos.1kg/fed.+30kgP_2O_5/ fed.	2770	540	1700	3.61	10.92	14.53	2900	510	1710	3.74	11.10	14.84
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	2880	530	1710	3.47	11.01	14.48	3000	520	1720	3.79	11.18	14.97
Bronco	Control	1890	450	1150	2.35	8.79	11.14	1190	450	1160	2.44	9.05	11.49
	Phos.0.5kg/ fed.	2110	460	1260	2.57	9.78	12.35	2140	470	1280	2.64	10.05	12.69
	Phos.1kg/ fed.	2370	480	1440	2.66	10.13	12.79	2510	490	1500	2.68	10.54	13.22
	30kgP_2O_5/ fed.	2540	560	1480	2.77	10.29	13.06	2570	540	1560	2.90	10.60	13.50
	60kgP_2O_5/ fed.	2750	570	1530	2.93	10.48	13.41	2620	580	1560	2.90	10.83	13.73
	Phos.0.5kg+30kgP_2O_5/ fed.	2610	610	1570	3.08	10.60	13.68	2700	600	1610	3.11	10.85	13.96
	Phos.0.5kg+60kgP_2O_5/ fed.	3100	660	1630	3.32	10.75	14.07	3030	660	1660	3.24	10.90	14.14
	Phos.1kg/fed.+30kgP_2O_5/ fed.	3130	640	1680	3.43	10.89	14.32	3130	630	1660	3.36	11.05	14.41
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	3100	640	1750	3.48	11.08	14.56	3070	630	1700	3.67	11.32	14.99
L.S.D at 0.05		n.s	40	n.s	0.12	0.34	0.32	130	40	50	0.16	92	0.35

4-7- Seed quality-:

Data presented in Table (14) show the effect of cultivar, phosphorine and phosphorus fertilizers on seeds quality expressed as weight of 100 seeds, seed germination percentage and germination rate.

Regarding the effect of cultivars, presented data at Table (14) show clearly that, there were a differences in weight of 100 seeds, germination

percentage and germination rate of produced seeds among the studied germplasm. Such results reached the level of significancy in case of seeds index and germination percentage during the first season and seed indexand germination rate during the second season of study.

In this concern, cv. Giza 6 Possess the highest values in all the studied seeds quality during both seasons of study. Such results may attributed to the difference in cultivars potentiality represented in seeds size and the storage attributes in side the seeds which represent the substrate for germination embryos. Obtained results are in agreement with those reported by ***Vidal et al. (1982), El-Sayed (1990b)Abou El-Hassan et al. (1993) and Mohamed (1997)*** all working on common bean, they reported that there were a differences between studied cultivars for 100 seeds weight.

Concerning the effect of phosphatic fertilizers the same data presented in Table (14) show clearly that application of phosphatic fertilizers either in a single form or in combinations

Table (14): Seed quality as affected by variety, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000			2001		
		Germination		100 seeds weight (g)	Germination		100 seeds weight (g)
Cultivar	Fertilization level	%	Rate (day)		%	Rate (day)	
Giza 6		90.37	2.16	43.59	90.50	2.17	43.27
Bronco		89.16	2.15	20.59	89.05	2.11	20.08
L.S.D. at 0.05		1.04	n.s	0.81	n.s	0.05	0.94
	Control	83.08	2.29	28.15	85.25	2.26	27.90
	Phos.0.5kg/ fed.	85.33	2.26	30.35	87.00	2.22	29.64
	Phos.1kg/ fed.	87.25	2.21	31.20	87.75	2.19	30.29
	30kgP_2O_5/ fed.	89.75	2.17	31.83	88.75	2.18	31.01
	60kgP_2O_5/ fed.	90.83	2.13	32.35	90.30	2.12	31.75
	Phos.0.5kg+30kgP_2O_5/ fed.	91.25	2.11	33.12	91.30	2.09	33.04
	Phos.0.5kg+60kgP_2O_5/ fed.	94.00	2.05	33.80	92.60	2.04	33.95
	Phos.1kg/fed.+30kgP_2O_5/ fed.	93.00	2.07	33.98	92.41	2.06	33.74
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	93.41	2.08	33.99	92.16	2.08	33.75
L.S.D at 0.05		1.53	0.04	1.44	2.20	0.05	1.35

at different used level significantly affected seeds quality expressed as weight of 100 seeds, germination percentage and germination rate compared to the chick treatment. In this regard, application of phosphatic fertilizers i.e. phosphorine and phosphorus in combination positively affected seeds quality compared with using such fertilizers in a single form. In addition, no significant differences were noticed between such treatment in combination form during both seasons of study. Moreover, application of phosphorine at 0.5 kg combined with phosphorus at rate of 60 kg P_2O_5 / fed. reflected the highest values of germination rate and percentage during both seasons of study. Obtained results were similar to those indicated by ***SuryanaRayana*** and ***Kumar (1981), Vidal et al. (1982), El-Gizy (1990),Abaza (1991) Abd el-Hafez (1994), El-Shamma (2000)*** and ***Ismael (2001).*** They indicated that the 100 seeds weight was increased by increasing P-application level. On the other hand, ***Midan et al .(1980), Vieira (1989)*** on bean, and ***Kothari and Saraf (1986)*** on cowpea found that phosphorus application had no significant effect on seed index. Moreover, ***Michail et al. (1996)*** and ***Kerolus et al. (1998)*** working on cowpea phosphorine treatments had any significant effect on the weight of 100 seeds.

With regard to the effect of the interaction between the studied cultivars and phosphatic fertilizers data in Table (15) revealed that with the exception of weight of 100 seeds which was significantly affected no significant differences could be detected in both germination percentage and rate during the two

growing season due to the interaction. However, the highest seed index was obtained due to the application of the highest used level of phosphorine and phosphorus i.e. 1 kg phosphorine -plus 60 kg P_2O_5 / fed respectively. during the first seasons and 0.5 kg phosphorine plus 60 P_2O_5/ fed. during the second season. Obtained results are in conformity with those reported by ***Abou El-Hassan et al .(1993)***on common bean concerning the effect of phosphorus fertilizer.

Table (15): Seed quality as affected by variety, phosphorus and phosphorine fertilization level during 2000 and 2001 seasons.

Treatments / Season		2000			2001		
		Germination		100 seeds weight (g)	Germination		100 seeds weight (g)
Cultivar	Fertilization level	%	Rate (day)		%	Rate (day)	
Giza 6	Control	83.6	2.29	38.62	86.0	2.27	38.15
	Phos.0.5kg/ fed.	85.6	2.28	42.41	88.0	2.25	41.03
	Phos.1kg/ fed.	87.5	2.22	42.44	88.5	2.23	41.50
	30kgP_2O_5 / fed.	90.0	2.17	42.80	89.5	2.22	42.04
	60kgP_2O_5 / fed.	91.3	2.14	43.67	90.3	2.16	43.24
	Phos.0.5kg+30kgP_2O_5/ fed.	91.5	2.11	45.17	92.0	2.13	45.11
	Phos.0.5kg+60kgP_2O_5/ fed.	94.6	2.03	45.39	93.6	2.04	46.21
	Phos.1kg/fed.+30kgP_2O_5/ fed.	93.6	2.07	45.89	93.5	2.09	46.12
	Phos.1kg/ fed. + 60kgP_2O_5/ fed.	95.3	2.08	45.96	93.0	2.11	46.05
Bronco	Control	82.5	2.28	17.69	84.5	2.26	17.66
	Phos.0.5kg/ fed.	85.0	2.24	18.30	86.0	2.20	18.25
	Phos.1kg/ fed.	87.0	2.18	19.98	87.0	2.16	19.10
	30kgP_2O_5 / fed.	89.5	2.17	20.87	88.0	2.14	19.99
	60kgP_2O_5 / fed.	90.3	2.13	21.05	90.3	2.08	20.27
	Phos.0.5kg+30kgP_2O_5/ fed.	91.0	2.10	21.09	90.6	2.06	20.99
	Phos.0.5kg+60kgP_2O_5/ fed.	93.3	2.06	22.22	91.6	2.03	21.70
	Phos.1kg/fed.+30kgP_2O_5/ fed.	92.3	2.07	22.08	91.3	2.04	21.36
	Phos.1kg/ fed.+ 60kgP_2O_5/ fed.	91.5	2.09	22.04	91.3	2.05	21.45
L.S.D at 0.05			n.s	1.8	n.s	n.s	1.90