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Response of Cotton Plant (Giza 88 Cultivar) to NPK Fertilizers After Berseem and Faba Beans as Preceding Winter Crops

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TWO FIELD experiments were carried out at Bassyoun Centre, El-Gharbia Governorate in 2003 season and repeated in 2004 season, to study the effect of NPK rates on leaf nutrient contents, growth, yield and yield components of the Egyptian extra long staple cotton cultivar, Giza 88 after berseem and faba beans as preceding winter crops.

Six treatments for each experiment were applied and the experimental design was randomized complete blocks with four replicates. The best NPK rate with clover preceding cotton was(75 kgN +13.1kg P +40 kg K)/fed. However, the best rate with faba beans preceding cotton was(30 kgN+13.1kg P+ 40 kgK)/fed.

The results indicated that NPK rates significantly increased leaf N, P, K, Ca, Fe, Mn an Zn contents in each experiment, Plant height at harvest and number of fruiting branches/plant were positively affected by NPK rates. The same treatments had significant effects on number of open bolls/ plant and seed cotton yield / plant as well as/fed.

Cotton planted after berseem, faba beans and wheat has become a widespread agricultural practice in Egypt due to the highest total net income per unit land area is obtained from cotton following these crops rather than from seed cotton alone (El-Moghazy *et al.*, 1984).

The appropriate level and balanced of the three major fertilizer elements N, P and K is one of numerous management factors that could achieve higher yield. The response of cotton plants to NPK was previously investigated by several researchers, Abd El-Aal *et al.* (1990) concluded that application of (75 kgN. + 20 kg K) /fed. accompanied by 13.1 kg P/fed. had the most favourable effects on cotton yield and its components. Abd El-Hadi *et al.* (1995) found that using different rates of nitrogen, phosphorus and potassium fertilizers indicated that addition of (33.6 kgN + 6.77 kg P+ 20 kg K)/ fed. markedly increased cotton yield. Ziadah and El-Shazly(1998) reported that plant need a balanced ratios of

essential macro and micro nutrients with non deficient and non in excess for optimum and economical yield. The aim of the research was to evaluate the effect of crops preceding cotton Giza 88 cultivar on its requirements of NPK

Materials and Methods

Field experiments were carried out in Bassyoun Centre, El-Gharbia Governorate during 2003 and 2004 seasons using the Egyptian extra long staple cotton cultivar, Giza 88. In each season, two separate experiments were carried out to study the effect of six rates of NPK fertilization on leaf nutrient contents, growth, seed cotton yield and yield components for cotton preceded by berseem and faba beans, respectively.

Treatments of cotton preceded by berseem

1.(45 kgN+9.83 kg P+20kg K)/fed.
2.(45 kgN+13.1kg P + 40kg K)/fed.
3.Control*(60 kgN+9.83 kgP+20kgK)/fed.
4.(60kgN+13.1kg P + 40kg K)/fed.
5.(75 kgN + 9.83 kg P+20kg K)/fed.
6.(60kgN + 13.1kg P + 40kg K)/fed.

* & ** the recommended rates.

Treatments of cotton preceded by faba beans :

1.Control**(30 kgN +9.83 kg P+20kg K)/fed.
2.(30 kgN+13.1kg P + 40kg K)/fed.
3.(45 kgN + 9.83 kg P+20kg K)/fed.
4.(45 kgN + 13.1kg P + 40kg)/fed.
5.(60 kgN+ 9.83 kg P+20kg K)/fed.
6.(75 kgN+13.1kg P + 40kg K)/fed.

In both seasons, in the first experiment Egyptian clover or berseem *(Trifolium alexandrinum* L *)* was sown on the 15th of November, where two cuts were taken. Cotton was sown on 1st April. But, in the second experiment, faba beans (*Vicia faba* L.) was sown on the 15th of November, where harvest was done on 15th April. Cotton was sown on 21th April. The experimental design in each experiment was a randomized complete blocks with four replicates. In both seasons, the plot size was 41.6 m^2 with 8 rows of 65 cm wide and 8m long with hill 25cm apart. The two outer rows were left as a border.

Phosphorus fertilizer levels were added as calcium superphosphate (15.5% P_2O_5) at sowing. Nitrogen levels were applied in the form of ammonium nitrate (33.5 % N) in two equal portions, the 1st portion was applied after thinning and the 2nd portion was added at the following irrigation in the experiment of cotton preceded by berseem, while in the second experiment with cotton preceded by faba beans, the N levels were applied in one dose after thinning. Potassium fertilizer levels were added as potassium sulphate (48% K_2O) in one dose after thinning. Other cultural practices were carried out as recommended for the conventional cotton planting.

Studied characters

Soil analysis

Representative soil samples were taken from one layer (0-40) before planting and prepared for analysis according to Chapman and Pratt (1978).The results of physical and chemical analysis of the experimental soil sites are presented in Table 1.

TABLE I. Physical and chemical analysis of experimental sites during two seasons.

Characteristics		Cotton preceded by berseem		Cotton preceded by faba beans	
		2003	2004	2003	2004
Texture		Clay	Clay	Clay	Clay
pH(1:2.5soil: water)		8.1	8.O	7.9	8.0
E.C(dsm-1)		1.10	1.16	1.0	1.20
CaCO3 %		1.30	1.50	2.4	1.80
O.M. %		1.70	1.95	1.6	1.9
Total N		58.5	59.1	56.0	59.5
Available P	mg/l00gsoil	1.15	1.33	1.00	2.30
Available K.		9,70	14.2	15.1	16.2
Available Na		50.6	40.3	66.3	100.0
Available Mg		148.3	139.7	150.5	140.0
Available Fe	mg/kg soil	18.9	21.6	20.0	22.1
Available Mn		5.11	6.01	5.8	4.3
Available Zn		1.11	1.22	0.8	1.0
Available Cu		5.10	4.93	4.1	5.6

Leaf nutrient contents

After 75 days from sowing a representative leaf sample (20 leaves) was taken from the youngest fully matured leaves (the upper 4th leaf on the main stem) from each plot. After samples preparation for analysis, concentrations of Fe, Mn, Zn and Cu were determined with an Atomic Absorption Spectrophotometer and contents of total P, K, Na, Mg and Ca were determined according to Chapman and Pratt (1978). Also total N percentage was determined using Micro- Kjeldahl method as described by Allen (1953).

Growth traits

At harvest, plants of five guarded hills were taken at random from the second row of each plot to determine plant height (cm) and number of fruiting branches/plant.

Seed cotton yield and its components

The same five guarded hills were also used to determine the following yield components: number of open bolls/plant, boll weight (g), seed cotton yield/plant (g), lint % and seed index (g).

Seed cotton yield/fed.* in kentars** was calculated from the yield of the 6 inner rows of each plot in both seasons.

The data obtained were subjected to statistical analysis by the procedure outlined by Snedecor and Cochran (1967) and the treatments means were compared using L.S.D at the level of 0.05 probability.

* One feddan = 4200.83 m2

** One kentar = 157.5 kg

Results and Discussion

Soil characters

Data in Table 1 indicated that soil samples were characterized by clay texture,high pH, low contents of $CaCO_3$ as well as organic matter and E.C. reflecting on salinity problems. Available nutrient contents were low for N and K, meanwhile. P was ranged between low and medium. Na content was high as well as Mg was medium. Fe and Cu contents were high, while Mn and Zn contents were low according to Ankerman and Large (1974).

Leaf nutrient contents

Data in Tables (2 and 3) show the effect of NPK rates on leaf macro and micronutrients contents, respectively in both seasons as affected by NPK rates.

With regard to cotton preceded by berseem, results in Table 2 indicate that NPK rates had a significant effect on leaf N, P, K and Ca contents, where the high NPK rate (75 kgN + 13.1 kg P + 40 kg K) /fed. enhanced the leaf contents of these elements. On the other hand, the low NPK rate (45kgN + 9.83 kg P+ 20 kg K)/fed. gave a significant increase in the leaf Na and Mg contents in both seasons (Table 2) .

With respect to leaf micronutrients contents, results in Table 3 indicate that the tested treatments gave a significant effect on leaf Fe, Mn and Zn contents in both seasons, where the highest leaf Fe, Mn and Zn contents were obtained from NPK high rate and the lowest values were obtained from the low NPK rate. However, leaf Cu content did not affect by the tested treatments.

With regard to cotton preceded by faba beans, the results indicated that NPK rates significantly affected leaf N, P, K, Na, Mg and Ca contents in both seasons in favour of the rate (30 kgN + 13.1 kg P+ 40 kg K)/fed. as shown in Table 2.

It is obvious that NPK rates significantly affected leaf Fe, Mn and Zn contents in favour of the rate (30 kgN + 13.1 kg P + 40 kg K)/fed. On the other hand, leaf Cu content did not affect by NPK rates (Table 3). The preceding legume removes considerable amounts of P, K and micronutrients. This imbalanced fertilizer regime maximizes the negative effects of high and low organic matter that characterizes soils of irrigated arid regions (Serry, 1980 and Sillanpää, 1982). In this concern, Wallace (1983) mentioned that high pH and low organic mater in soil considerably reduced availability of most nutrients to plant included N, P and micronutrients. In addition, the negative effect of clay texture on P and K was mentioned by Menegel and Kirkby (1982).

TABLE 2. Effect of NPK fertilization rates on leaf macro nutrients content of cotton preceding by winter crops in 2003 and 2004 seasons.

NPK rates / fed.	%											
	N		P		K		Na		Mg		Ca	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
	Cotton preceding by berseem											
T_1 (45 kgN + 9.83 kgP + 20 kg K) / fed.	2.64	2.71	0.22	0.26	2.21	2.23	0.38	0.30	0.66	0.71	1.76	1.13
T_2 (45 kgN + 13.1 kgP + 40 kg K) / fed.	2.64	2.78	0.22	0.27	2.25	2.26	0.37	0.29	0.66	0.68	1.83	1.38
T_3 (60 kgN + 9.83 kgP + 20 kg K) / fed.	3.10	3.07	0.27	0.29	2.26	2.27	0.37	0.27	0.63	0.65	1.93	1.78
T_4 (60 kgN + 13.1 kgP + 40 kg K) / fed.	3.11	3.18	0.28	0.29	2.59	2.69	0.36	0.27	0.60	0.63	2.18	1.88
T_5 (75 kgN + 9.83 kgP + 20 kg K) / fed.	3.41	3.56	0.31	0.34	2.62	2.70	0.35	0.24	0.56	0.57	2.36	2.23
T_6 (75 kgN + 13.1 kgP + 40 kg K) / fed.	3.52	3.75	0.31	0.36	2.66	2.74	0.34	0.22	0.53	0.57	2.48	2.28
F - test	**	**	**	**	**	**	**	*	**	**	**	**
L.S.D.0.05	0.14	0.18	0.02	0.01	0.14	0.09	0.01	0.04	0.02	0.04	0.16	0.19
	Cotton preceding by faba beans											
T_1 (30 kgN + 9.83 kgP + 20 kg K) / fed.	3.09	3.26	0.31	0.33	2.72	3.15	0.37	0.53	0.49	0.51	1.85	2.21
T_2 (30 kgN + 13.1 kgP + 40 kg K) / fed.	3.47	3.33	0.33	0.34	2.79	3.18	0.37	0.52	0.51	0.52	1.88	2.51
T_3 (45 kgN + 9.83 kgP + 20 kg K) / fed.	2.71	2.88	0.26	0.27	2.44	2.49	0.35	0.48	0.47	0.50	1.73	1.97
T_4 (45 kgN + 13.1 kgP + 40 kg K) / fed.	2.88	2.87	0.26	0.27	2.68	2.97	0.36	0.46	0.47	0.48	1.65	1.85
T_5 (60 kgN + 9.83 kgP + 20 kg K) / fed.	2.50	2.35	0.23	0.24	2.25	2.58	0.32	0.46	0.40	0.45	1.40	1.64
T_6 (60 kgN + 13.1 kgP + 40 kg K) / fed.	2.65	2.53	0.23	0.25	2.40	2.66	0.34	0.44	0.36	0.45	1.40	1.35
F - test	**	**	**	**	**	**	**	*	**	**	**	**
L.S.D.0.05	0.14	0.24	0.01	0.01	0.09	0.20	0.02	0.07	0.02	0.01	0.09	0.10

* and ** indicate $P < 0.05$ and $P < 0.01$, respectively

TABLE 3. Effect of NPK fertilization rates on leaf micronutrients content of cotton preceding by winter crops in 2003 and 2004 seasons.

NPK rates / fed.	ppm							
	Fe		Mn		Zn		Cu	
	2003	2004	2003	2004	2003	2004	2003	2004
	Cotton preceding by berseem							
T_1 (45 kgN + 9.83 kgP + 20 kg K) / fed.	309	258	33.8	28.9	33.2	36.5	11.1	8.8
T_2 (45 kgN + 13.1 kgP + 40 kg K) / fed.	364	273	33.9	34.6	35.2	43.0	11.4	9.0
T_3 (60 kgN + 9.83 kgP + 20 kg K) / fed.	416	276	33.9	35.1	45.3	46.2	11.5	9.3
T_4 (60 kgN + 13.1 kgP + 40 kg K) / fed.	425	396	43.5	39.2	45.8	52.0	11.6	9.4
T_5 (75 kgN + 9.83 kgP + 20 kg K) / fed.	451	421	44.0	47.3	46.5	55.4	11.87	9.4
T_6 (75 kgN + 13.1 kgP + 40 kg K) / fed.	456	481	49.7	49.4	51.1	62.4	11.9	9.6
F – test	**	**	**	**	**	**	NS	NS
L.S.D.0.05	17	16	4.9	5.8	4.9	3.0	-	-
Cotton preceding by faba beans								
T_1 (30 kgN + 9.83 kgP + 20 kg K)/ fed.								
T_2 (30 kgN+ 13.1 kgP + 40 kg K) / fed.	338	415	63.3	65.1	28.6	38.0	10.7	7.9
T_3 (45 kgN + 9.83 kgP+ 20 kg K)/ fed.	375	426	68.1	65.2	37.1	40.4	10.7	7.5
T_4 (45 kgN + 13.1 kgP + 40 kgK)/ fed.	361	330	59.2	56.6	28.3	28.9	10.6	7.5
T_5 (60 kgN + 9.83 kgP +20 kg K)/ fed.	363	394	63.3	64.8	27.2	36.2	10.5	7.2
T_6 (60 kgN+ 13.1 kgP + 40 kg K) / fed.	229	294	52.5	57.1	26.9	28.6	10.5	7.2
	257	318	58.1	53.7	25.8	27.2	10.3	7.1
F – test	**	**	**	**	**	**	NS	NS
L.S.D.0.05	7	14	2.3	4.0	3.4	3.6	-	-

** and NS indicate P < 0.01and not significant, respectively

Growth traits

Results presented in Table 4 show that plant height at harvest and number of fruiting branches/plant of cotton preceded by berseem were significantly affected by the different NPK rates in both seasons, where the tallest plants and the highest number of fruiting branches/plant were produced when the three macronutrients were applied at the high rate.

This result may be due to the increase in the meristematic activity as well as production of auxin which encourage cell elongation. Darwish and Hegab (2000) indicated the same finding. Abd El-Aal *et al.* (2000) found that applying the high rate of NPK (75 kgN + 13.1 kg P+ 40 kg K)/fed. increased significantly plant height at harvest and number of sympodia /plant only in one season. Darwish *et al.* (1994) found that (40 kgN + 20 kg K) or (60 kgN + 20 kg K) per feddan, besides a basic dose of 9.83kg P/fed. had little effect on final plant height and number of fruiting branches/plant.

Results of cotton preceding by faba beans in the same table show that the tallest plants and the lowest number of fruiting branches/plant were obtained by the treatment received (60 kgN + 9.83 kg P+ 20 kg K)/fed., while the shortest plants and the highest number of fruiting branches/plant were produced from the treatment received (30 kgN + 13.1 kg P+ 40 kg K)/fed. The increase in cotton plant height at harvest due to the high rate of NPK fertilization may be due to many reasons, the increase in available soil nitrogen after faba beans which stimulated the growth of cotton plants (El-Moghazy *et al.*, 1984) or increasing N levels increase the meristematic activity as well as production of auxin which encourage cell division and elongation (Darwish and Hegab, 2000).

Seed cotton yield and its components

It is worthly to observe in Tables (4 and 5) that the tested treatments for cotton preceded by berseem had a significant effect on number of open bolls/plant, seed cotton yield/plant as well as/fed. in both seasons, where the highest values of these traits were produced when the three macronutrients were applied at the high rate. NPK did not cause any significant effect on lint %, seed index and boll weight in both seasons. The increment of these traits due to the use of high NPK is mainly attributed to the role of this rate in increasing leaf N, P, K, Ca, Fe, Mn and Zn contents (Tables 2 and 3) which are known to promote photosynthesis and assimilation accumulation and consequently plant development and production. In this concern, Ghourab *et al.* (2000) found that the application of 90 kgN/fed, significantly increased seed cotton yield/plant as well as/fed. and reduced seed index. El-Beily *et al.* (2001) found that N fertilizer rates (40, 60 and 80 kgN/fed.) has a significant effect on number of open bolls/plant, seed cotton yield/plant as well as/fed, in both seasons in favour of the high N rate (80 kgN/fed.). Ziadah and El-Shazly (1998) reported that the

increasing of P from 9.83 to 13.1 kg P/fed. and K from 20 to 40 kg K/fed. may be increased the effeciency of N application at high rate of 75 kgN/fed. This means that N is advisable to apply more than 60 kg N/fed. for early sowing plants and become more effective in increasing cotton productivity if P and K were added in reasonable rates to create balance among these three major elements.

The data of total soil N and available soil P and K presented in Table 1 may explain the positive response to early planting after clover to the higher NPK rate.Makram *et al.*(1994) reported that the sufficient content of available potash control the effect of higher nitrogen dose. Tomar *et al.* (1986) found that addition of K to NP was more effective at the higher NP rates than at lower rates.

Hibberd *et al.* (1990) obtained yield response to P at sites although soil P concentration was generally higher at these sites. Abd El-Aal *et al.* (2000) found that soil application rates of NPK had insignificant effects on number of open bolls/plant, boll weight, seed cotton yield/plant, lint %, seed index and seed cotton yield/fed, in both seasons, and they attributed this to the relative moderate contents of available NPK in the experimental soil. Darwish *et al.* (1994) found that yield components/plant increased with relatively low supplied of N, i.e. 20 kg/fed, or with moderate dose, i.e. 40 kgN/fed. plus 20 kg K/fed. and they attributed this to the high content of soil nutrients. Hamissa and Abdel Salam (1999) concluded that cotton grow on low fertility soils is more responsive to fertilizers than grown on high fertility soil. In the low fertility soil, the response of cotton extended to (75 kgN + 6.55 kg P)/fed., the average increase in seed cotton yield/fed, than that obtained from the control amounted to 48.9%, while for cotton grown in high fertility soil, the yield response caused at (45 kgN + 6.55 kg P)/fed. The average increase in yield than the control was only 15.2 %. The variation among these findings may be due to the location environmental (Boman *et al.*, 1995) or to the cultivar response (Sharma and Tomar, 1995) or to the soil fertility (Hamissa and Abdel Salam, 1999).

Amounts of NPK in balanced rates should be applied in order to secure an optimal supply of nitrogen, phosphorus and potassium to the cotton variety Giza 88. Boman *et al.* (1995) reported that in low yielded environments applied N resulted in no yield benefit, however, in high yielding environments applied N increased lint yield. Sharma and Tomar (1995) found that cultivars divered in their positive response to N application.

Data of cotton preceded by faba beans in Tables (4 and 5) show that NPK rates significantly increased number of open bolls/plants, seed cotton yield/plant as well as/fed, in both seasons in favour of treatment which received (30 kgN + 13.1 kg P+ 40 kg K)/fed. On the other hand, boll weight, lint % and seed index did not affect by NPK rates in both seasons. This is mainly attributed to the late of cotton sowing as a faba beans a preceding crop for cotton where this rate induced the balance between the vegetative growth and fruiting productivity of late cotton plants.

TABLE 4. Effect of NPK fertilization rates on some cotton growth traits, lint % and seed index of cotton preceding by winter crops in 2003 and 2004 seasons.

NPK rates / fed.	Final plant height , cm		No.of fruiting branches / plant		Lint %		Seed index,g	
	2003	2004	2003	2004	2003	2004	2003	2004
	Cotton preceding by berseem							
T_1 (45 kgN + 9.83 kgP + 20 kg K)/ fed.	121.3	119.5	12.7	13.1	37.6	37.9	10.76	10.83
T_2 (45 kgN + 13.1 kgP + 40 kg K) / fed.	121.5	120.0	13.6	13.7	37.9	38.0	10.84	10.87
T_3 (60 kgN + 9.83 kgP + 20 kg K) / fed.	127.5	121.5	14.0	14.1	37.3	38.1	10.83	10.85
T_4 (60 kgN + 13.1 kgP + 40 kg K) / fed.	135.8	128.3	14.1	14.8	37.6	37.9	10.82	10.94
T_5 (75 kgN + 9.83 kgP + 20 kg K) / fed.	136.0	135.8	14.9	15.3	37.5	37.7	10.91	11.02
T_6 (75 kgN + 13.1 kgP + 40 kg K) / fed.	136.0	136.3	15.6	16.1	38.0	38.3	10.99	11.02
F – test	**	**	**	**	NS	NS	NS	NS
L.S.D.0.05	3.2	3.7	0.7	0.4	-	-	-	-
	Cotton preceding by faba beans							
T_1 (30 kgN + 9.83 kgP + 20 kg K) / fed.	127.8	124.0	14.2	15.0	37.7	37.8	10.86	10.30
T_2 (30 kgN +13.1 kgP + 40 kg K) / fed.	123.8	123.3	14.6	15.2	37.7	37.6	10.62	10.37
T_3 (45 kgN + 9.83 kgP + 20 kg K) / fed.	131.5	128.0	13.9	13.4	37.5	37.8	10.59	10.40
T_4 (45 kgN + 13.1 kgP + 40 kg K) / fed.	136.5	129.8	13.8	14.9	37.4	37.6	10.63	10.40
T_5 (60 kgN + 9.83 kgP + 20 kg K) / fed.	137.3	133.0	12.1	12.1	37.4	37.7	10.43	10.77
T_6 (60 kgN + 13.1 kgP + 40 kg K) / fed.	136.8	131.5	12.9	13.4	37.1	37.7	10.41	11.10
F – test	**	**	**	**	NS	NS	NS	NS
L.S.D.0.05	3.7	3.5	0.8	0.5	-	-	-	-

** and NS indicate P < 0.01and not significant, respectively.

TABLE 5.Effect of NPK fertilization rates on number of open bolls/plant, boll weight, seed cotton yield/ plant and / feddan of cotton preceding by winter crops in 2003 and 2004 seasons.

NPK rates / fed.	No. of open bolls/plant		Boll weight (g)		Seed cotton yield / plant (g)		Seed cotton yield / fed. (kentar)	
	2003	2004	2003	2004	2003	2004	2003	2004
	Cotton preceding by berseem							
T_1 (45 kgN + 9.83 kgP + 20 kg K)/fed.	11.5	11.6	2.86	2.88	32.89	33.41	8.68	9.81
T_2 (45 kgN+13.1 kgP + 40 kg K) / fed.	11.7	12.5	2.94	2.91	34.40	36.38	9.08	10.02
T_3 (60 kgN + 9.83 kgP+ 20 kg K)/ fed.	12.3	12.8	2.80	2.90	34.44	37.12	9.36	10.03
T_4 (60 kgN +13.1 kgP + 40 kg K)/ fed.	13.1	13.7	2.92	2.95	38.25	40.42	10.14	10.82
T_5 (75 kgN + 9.83 kgP+ 20 kg K)/ fed.	13.2	14.0	2.93	2.97	38.68	41.58	10.26	11.06
T_6 (75 kgN +13.1 kgP + 40 kg K)/ fed.	13.9	14.7	2.96	3.00	41.1	44.1	11.19	11.75
F – test	**	**	NS	NS	**	**	**	**
L.S.D.0.05	1.1	0.7	–	–	2.16	1.69	0.43	0.55
	Cotton preceding by faba beans							
T_1 (30 kgN + 9.83 kgP+20 kg K)/ fed.	13.3	14.2	2.47	2.69	32.85	38.20	8.51	9.67
T_2 (30 kgN +13.1 kgP +40 kg K)/ fed.	14.2	16.0	2.45	2.67	34.79	42.72	9.20	10.85
T_3 (45 kgN + 9.83 kgP+20 kg K) / fed.	11.9	12..2	2.54	2.58	30.23	31.48	7.45	8 25
T_4 (45 kgN+13.1 kgP+ 40 kg K) / fed. T_5 (60	12.2	13.4	2.52	2.62	30.74	35.11	7.70	8.98
kgN + 9.83 kgP+ 20 kg K)/ fed.	11.7	11.9	2.48	2.71	29.02	32.25	7.30	8.04
T_6 (60 kgN +13.1 kgP+ 40 kg K)/ fed.	11.8	12.0	2.48	2.71	29.26	32.52	7.43	8.22
F – test	**	**	NS	NS	**	**	**	**
L.S.D.0.05	0.7	1.4	–	–	1.94	1.89	0.49	0.48

NS and ** indicate not significant and $P < 0.01$, respectively.

Conclusion

Finally, from the previous results it could be concluded the following points :

1. Under Bassyoun region for enhancing leaf macro and micro nutrients, promoting cotton plant growth and consequently high yield of cotton, the recommended NPK rate for the extra long staple cotton variety Giza 88 at the early planting, in case of cotton preceding by berseem should be (75 kgN + 13.1 kg P + 40 kg K)/fed. and at the late planting, in case of cotton preceding by faba beans should be (30 kgN + 13.1 kg P + 40 kg K)/fed.

2. The balance between the three major fertilizer elements N, P and K as soil applied fertilizer should take in consideration the previous crop, the soil available macro and micro-nutrients, time of sowing and variety to give correct recommendation.

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استجابة نبات القطن (صنف جيزة ٨٨) المنزرع عقب برسيم وفول بلدى كمحصولين شتويين سابقين للتسميد بالنيتروجين والفوسفور والبوتاسيوم

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و ** معهد بحوث القطن ــ مركز البحوث الزراعية ــ وزارة الزراعة ــ الجيزة ــ مصر .

أجريت تجربتان حقليتان بمركز بسيون بمحافظة الغربية فى موسم ٢٠٠٣ وكررتا فى موسم ٢٠٠٤ وذلك لدراسة تأثير معدلات تسميد بالنيتروجين والفوسفور والبوتاسيوم على محتوى الورقة من العناصر والنمو والمحصول ومكونات محصول القطن المصرى فائق طول التيلة صنف جيزة ٨٨ المنزرع عقب برسيم وفول بلدى كمحصولين شتويين سابقين حيث أضيفت ستة معاملات لكل تجربة وكان التصميم التجريبى قطاعات كاملة العشوائية مع وجود أربعة مكررات .

ولقد كان أفضل معدل للنيتروجين والفوسفور والبوتاسيوم مع البرسيم السالف للقطن هو ٧٥ كجم ن + ١٣,١ كجم فو + ٤٠ كجم بو للفدان بينما كان أفضل معدل للنيتروجين والفوسفور والبوتاسيوم مع الفول البلدى السالف للقطن هو ٣٠ كجم ن +١٣,١ كجم فو + ٤٠ كجم بو للفدان.

كما أكدت النتائج أن معدلات التسميد بالنيتروجين والفوسفور والبوتاسيوم أدت لزيادة معنوية لمحتوى الورقة من النيتروجين والفوسفور والبوتاسيوم والكالسيوم والحديد والمنجنيز والزنك فى كل تجربة وتأثر طول النبات عند الجنى وكذلك عدد الأفرع الثمرية على النبات ايجابياً بالمعاملات السابقة وأثرت نفس المعاملات معنوياً على عدد اللوز المتفتح على النبات و محصول القطن الزهر للنبات وللفدان .