J. Agric. Sci. Mansoura Univ., 30 (10): 6325 - 6333, 2005

SOME TECHNOLOGICAL CHARACTERISTICS AND YIELD OF SOME COTTON VARIETIES AS AFFECTED BY APPLICATION OF UREA AMMONIUM NITRATE, SULPHUR AND PHOSPHORIEN

Hammad, S. A.[*]; A. A. Abd El-Magid,[**] ; H. G. Abu El-Fotoh[**] and M. H. El-Mancy [***]

[*]**Soil Sci. Dept., Fac. of Agriculture, Mansoura University**

[**]**Plant Nutrition Dept., Soil, Water & Env. Inst., Agric. Res. Center**

[***]**Efficient Productivity Inst., Zagazig Univ., Egypt.**

ABSTRACT

Two field experiments were carried out in farmer fields during 2003 and 2004 summer seasons at Sherbeen, Dakhalia governorate to study the effect of UAN (Urea ammonium nitrate, 32% N), agric. sulphur (S) and phosphorien (Biofertilizer) application under recommended dose of NPK fertilizers (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}) on cotton plant growth, seed cotton yield, lint percent, oil content of seeds and protein content of kernel seeds of the Egyptian cotton varieties Giza 86, G. 87, G. 88 and G. 89.The results indicated that:

1. The highest seed cotton yieldfed^{-1} was realized from all varieties by foliar UAN application under recommended dose of NPK (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}).
2. Using phosphorien, UAN and S with NPK (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}) increased lint percent, plant height, No. of open bolls/plant, seed index and boll weight in four cotton varieties.
3. The study showed the vital importance of soil analysis, which indicated low levels of available N, P, K and S and the soil must be fertilized with the economically beneficial amounts of these nutrients when cropped with cotton.
4. Protein, oil content in seeds and N, P and S contents fully developed leaves at the beginning of flowering stage and were increased by using UAN, phosphorien and S treatments application.
5. These clearly concluded that UAN, phosphorien and S treatments could be used with NPK (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}) under the Egyptian conditions as effective for improving seed cotton yield and quality of cotton varieties Giza 86, G. 87, G. 88 and G. 89. Meanwhile, these treatments lowered soil pH which resulted in increasing the availability of some nutrients as P and S in soil.

INTRODUCTION

Cotton is considered one of the major crops which plays an important role in Egyptian economy. Egyptian cotton (*Gossypium barbadense*) is an important cash crop for the Egyptian farmer, and a vital source of row material for Egyptian income. The efforts of most agronomists are to increase its productivity.

The intensive cultivation depletes the Egyptian soil of some plant nutrients, which could be compensated by fertilizers application. The early recorded results on cotton fertilization under local conditions indicated that nitrogen is the limiting element for cotton production.

Sulphur compounds have been known as soil amendment to correct soil alkalinity. Many studies as reported by Mathers (1970) stressed that the

role of sulphur is to increase the availability of plant nutrients as a result of its oxidation to sulphuric acid. Hilal *et al.* (1979) reported that when elemental sulphur was well distributed in the top 10 cm of alkaline calacarous soils, it exerted a better effect on soil properties as compared with the addition of diluted sulphuric acid to the soil surface.

Interactions between added S and P received the attention of many investigations, Aulakh and Pasrisha (1977) showed that the yield increased with the application of S and P individually but decreased when S and P were applied in different combinations. In Egypt, Eid and Hamissa, (1969), Yassen *et al.*(1990), Khater *et al.*, (1991), El-Akabawy *et al.*, (2000) and Abd El-Magid, (2002) came to the same results.

The biofertilization like, (phosphorien) and sulphur on cotton are studied by several Egyptian researchers who indicated that cotton plants responded positively to phosphorin and sulphur (Neptune *et al.*, 1975, Nasseem *et al.*, 1981, Bayoumi *et al.*, 1985 and Abd El-Magid., 2002).

This work aimed to study the effect of nitrogen (UAN), sulphur and biofertilizer (phosphorien) treatments on cotton yield production for 4 varieties of cotton.

MATERIALS AND METHODS

Two field experiments were carried out in farmer fields during 2003 and 2004 summer seasons at Sherbeen, Dakhalia governorate to evaluate the effect of UAN (Urea ammonium nitrate, 32% N), agric. sulphur (S) and phosphorien (Biofertilizer) application under recommended dose of NPK fertilizers (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}) on cotton varieties (*Gossypium barbadensel* L.) Giza 86, G. 87, G. 88 and G. 89.

The experiment was designed in RCB with split plot design involving 16 treatments. Each treatment was replicated four times. So that, the total treatments equal 64 plots. Each plot = 3x3.5 m. The used treatments were as follows:

A. **Varities:**Giza 86 (v_1), Giza 87 (v_2), Giza 88 (v_3) and Giza 89 (v_4).

B. **Fertilizer treatments:** treatments could be illustrated as the following:

1. **Control**: N = 70 N kg fed^{-1} as ammonium sulphate (20.5%N). the nitrogen was added in two equal doses, the first after thinning (35 days after sowing) and the second after one month later. P = 30 P_2O_5 kg fed^{-1} as calcium superphosphate (15.5 % P_2O_5) and K= 24 K_2O kg fed^{-1} as potassium sulphate (48% K_2O). the phosphorus and potassium were applied during soil preparation before seeding.
2. **Urea ammonium nitrate (UAN, 32% N)**: The applied rate was 10 N kg fed^{-1}as foliar solution with two equal doses at 60 and 90 days from sowing date as 300 L fed^{-1}.
3. **Sulphur application (200 S kg fed^{-1}):** Fine powder sulphur was that applied during soil preparation before sowing.
4. **Phosphorien (biofertilizer):** The inoculation performed through mixing seeds with the appropriate amount of this after coating with arabic gum as adhesive material just prior to sowing.

The soil is clayey in texture. The physical and chemical analysis of the soil are shown in Table 1.

Table 1 :The physical and chemical analysis of the soil samples.

Seasons	Soil texture	O.M %	$CaCO^{-3}$ %	$CaSO^{-4}$ %	SO^{-4} meq/L	pH (1:2.5)	EC dSm^{-1}	Total N ppm	Available nutrients	
									P	K
1st season	Clayey	1.97	3.75	0.005	1.52	7.8	0.52	615	5.20	375
2nd season	Clayey	1.97	25.41	0.013	3.7	8.3	1.29	532	4.90	354

Cotton seeds were sown in April (12^{th} and 17^{th}) in the first and second seasons, respectively.

Seed contents were determined according to A. O. A. C. (1970), lint percentage (%) was calculated as the ratio between weight of lint (g) and seed cotton weight (g).

Plant samples were oven dried at 70°c till a constant weight and the dry weight was recorded. The plant materials were ground and sub-samples of 0.1(g) were wet-digested using $H_2SO^{=}_4$-$HCLO_4$ mixture according to Peterburgsiki (1968). Total nitrogen was determined by Kjeldahl method as aforementioned by Hesse, (1971), Phosphorus was determined calorimetrically at a wave length of 725 nm using Ziess spectrophotometer (Spekol) as described by Jackson (1967), potassium was determined using Gallen Kamp flame photometer as described by Jackson (1967).

All data were statistically analyzed according to the technique of analysis of variance (ANOVA) and the least significant differences between the treatment means as published by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Effect of nitrogen, phosphorien and sulfur on seed cotton yield:

The data in Table 2 indicate that seed yield and lint percentage of cotton were significantly affected with N, P and S application in 2003 and 2004 seasons.

Seed cotton yield, the most important parameter, was affected positively and significantly by NPS application and its splitting. Pooled data with respect seed cotton yield in Table 2 clearly indicate that fertilization of cotton plants with UAN, S and phosphorien caused a significant increased in the seed cotton yield of cotton plants over their respective control. However, the interaction effects of UAN, S and phosphorien were found to be significant.

A synergistic effect of UAN, S and phosphorien application in increasing seed cotton yield might be attributed to the enhanced root activities and root nodulation of plants resulting in a higher uptake of nutrients and thereby increasing the vegetation growth and yield, similar findings are absorbed by Rahee and Chahai (1977), Goos (1985), El-Akabawy *et al.* (2000) and Abd-Magid (2002).

Cotton yield and its components:

Data in Table 2 reveal that lint % values were slightly increased by the applications of the different treatments of UAN, S and phosphorien in comparison with the control in both seasons. The lowest lint % values were more effective by using UAN treatment on varieties G. 86, G. 87 and G. 88.

Table 2:Seed cotton yield (Kentar fed^{-1}) and lint percent as affected by different fertilization treatments.

Varieties	Treat.	Seed cotton yield (Kentar fed^{-1})				Lint %			
		2003	2004	Average	Δ increase %	2003	2004	Average	Δ increase %
G. 86	Control	7.97	8.35	8.16		38.33	38.36	38.35	
	UAN	9.45	10.45	9.95	21.94	39.41	39.80	39.61	3.29
	Phosph.	9.14	10.16	9.65	18.26	40.21	40.50	40.36	5.24
	Sulphur	8.83	9.65	9.24	13.24	40.56	40.68	40.62	5.92
L.S.D at 0.05		1.23	1.92			0.65	0.72		
G. 87	Control	6.23	6.96	6.60		28.82	29.10	28.96	
	UAN	8.34	9.44	9.90	34.74	29.68	30.35	30.02	3.66
	Phosph.	8.12	9.11	9.62	30.57	30.49	30.68	30.59	5.63
	Sulphur	7.85	8.95	8.40	27.31	30.72	30.82	30.77	6.25
L.S.D at 0.05		1.52	1.88			0.59	0.58		
G. 88	Control	6.77	7.84	7.15		32.27	32.65	32.46	
	UAN	8.95	9.25	9.10	27.20	33.55	33.72	33.64	3.64
	Phosph.	8.42	8.96	8.69	21.47	34.20	34.35	34.28	5.61
	Sulphur	8.15	8.74	8.45	18.05	34.50	34.65	34.58	6.53
L.S.D at 0.05		1.35	1.62			0.57	0.68		
G. 87	Control	7.85	8.48	8.17		34.44	35.10	34.77	
	UAN	9.85	9.93	9.89	21.13	36.40	36.85	36.63	5.35
	Phosph.	9.32	9.65	9.49	16.17	36.77	37.20	36.99	6.38
	Sulphur	8.76	9.13	8.95	9.55	37.19	37.35	37.27	7.19
L.S.D at 0.05		1.50	1.25			0.68	0.69		

As shown in Table 3, cotton plant characteristics were significantly affected by UAN, S and phosphorien. The plant height which increased due to UAN application can be ascribed to the nitrogen effect on all varieties. Open bolls (O.B.) per plant, boll weight (B.W.) and seed index were increased by using UAN, S and phosphorien treatments with all cotton varieties. The function of UAN, S and phosphorien in the cotton plants lies in their participation in protein structure in the from of the nitrogen, S and P bearing amino acids (Koinov and Petkov, 1976 and Abdel-Magid, 2002).

As seen in Table 4, the mean values of N, P, K and S contents in the developed cotton leaves at the beginning of flowering stage were increased by affecting UAN, S and Phosphorien treatments applications. These increases in N, P, K and S contents in the developed cotton leaves were caused increase in cotton yield and may be due to the UAN, S and phosphorien treatments to all cotton plants varieties which led to the depletion of N, P, K and S in the soil solution during the growth period of plants.

Table 3:Cotton characteristics as affected by different fertilization treatments.

Varieties	Treat.	Plant height (cm)		Seed index (g)		Open boll plant-1		Boll weight	
		2003	2004	2003	2004	2003	2004	2003	2004
G. 86	Control	73.8	75.2	8.41	8.53	6.8	7.2	2.45	2.48
	UAN	77.8	79.3	9.76	9.85	7.2	7.4	2.53	2.58
	Phosph	71.9	73.7	10.03	10.15	7.3	7.6	2.47	2.51
	Sulphur	72.3	74.5	10.80	10.87	7.5	7.8	2.51	2.56
L.S.D at 0.05		2.00	1.79	2.15	1.98	0.71	0.40	0.46	0.32
G. 87	Control	69.7	72.7	8.70	8.76	5.7	6.5	2.10	2.15
	UAN	72.9	76.4	10.21	10.42	6.5	6.8	2.16	2.21
	Phosph	68.5	71.5	10.43	10.58	6.6	6.9	2.14	2.19
	Sulphur	68.7	71.2	10.76	10.85	6.7	7.2	2.14	2.23
L.S.D at 0.05		1.56	1.86	1.36	1.20	0.65	0.36	0.66	0.39
G. 88	Control	72.4	74.8	8.83	8.86	5.9	6.8	2.14	2.19
	UAN	75.8	78.3	10.50	10.63	6.2	6.9	2.19	2.26
	Phosph	72.2	73.3	10.70	10.84	6.4	6.8	2.22	2.27
	Sulphur	71.3	72.8	10.80	10.89	6.6	6.9	2.20	2.28
L.S.D at 0.05		1.00	0.98	2.10	1.00	0.60	0.28	0.59	0.65
G. 87	Control	73.5	75.4	8.18	8.24	6.7	7.1	2.25	2.28
	UAN	76.9	78.5	9.22	9.34	6.9	7.4	2.27	2.34
	Phosph	72.1	73.9	9.86	9.95	6.8	7.5	2.29	2.32
	Sulphur	71.6	73.3	10.21	10.34	7.3	7.8	2.26	2.35
L.S.D at 0.05		0.96	0.75	1.00	1.85	0.70	0.46	0.71	0.75

Cotton yield response to UAN, S and phosphorien has been recorded by several Egyptian authors (El-Aggory *et al.* 1991 and Abd el-Magid, 2002).

Seeds cotton of oil and Kernel seeds content of protein:

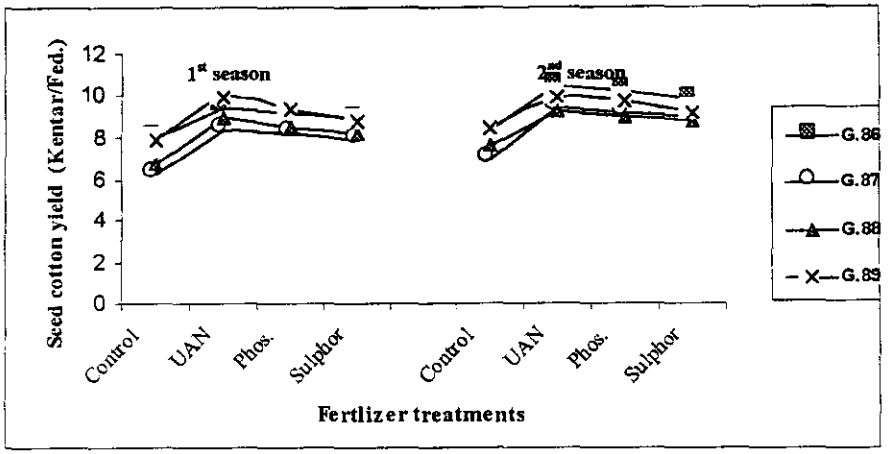
Data of Table 5 reveal that, increasing oil % and protein % in the seeds compared to control was significantly and positively correlated with using UAN, S and phosphorien treatments in all cotton varieties. Seed content of oil % reached the maximum when using phosphorien and S but the maximum seed content of protein % obtained by UAN treatment on all cotton varieties. This result is in good agreement with that obtained by EL-Akabawy *et al.* (2000), Abdel-Magid (2002) and Ragaa (1976).

Table 4:Mean values of N, P, K and S concentrations of fully developed cotton leaves as affected by different fertilization treatments.

Varieties	Treat.	Nutrient Concentrations (%)							
		N		P		K		S	
		2003	2004	2003	2004	2003	2004	2003	2004
G. 86	Control	4.1	4.3	0.26	0.28	3.2	3.1	0.23	0.22
	UAN	4.8	4.9	0.31	0.32	3.6	3.5	0.27	0.26
	Phosph.	4.5	4.6	0.28	0.28	3.4	3.4	0.24	0.26
	Sulphur	4.7	4.8	0.29	0.31	3.5	3.3	0.22	0.35
L.S.D at 0.05		0.29	0.35	0.09	0.10	0.24	0.26	0.034	0.039
G. 87	Control	3.9	3.7	0.27	0.25	3.1	3.0	0.21	0.20
	UAN	4.6	4.3	0.30	0.31	3.7	3.5	0.25	0.27
	Phosph.	4.2	4.1	0.29	0.28	3.5	3.2	0.23	0.25
	Sulphur	4.4	4.5	0.28	0.31	3.5	3.4	0.34	0.33
L.S.D at 0.05		0.22	0.28	0.07	0.09	0.31	0.28	0.032	0.036
G. 88	Control	3.8	3.4	0.25	0.23	3.4	3.2	0.24	0.22
	UAN	4.5	4.6	0.34	0.32	3.5	3.1	0.25	0.27
	Phosph.	4.3	4.1	0.32	0.34	3.3	3.2	0.24	0.26
	Sulphur	4.3	4.7	0.30	0.35	3.5	3.4	0.33	0.35
L.S.D at 0.05		0.24	0.31	0.08	0.11	0.28	0.27	0.034	0.039
G. 87	Control	4.2	4.3	0.28	0.26	3.5	3.2	0.21	0.23
	UAN	4.7	4.9	0.33	0.29	3.6	3.4	0.25	0.28
	Phosph.	4.6	4.2	0.31	0.32	3.4	3.1	0.24	0.27
	Sulphur	4.8	4.9	0.32	0.34	3.5	3.4	0.32	0.36
L.S.D at 0.05		0.20	0.25	0.08	0.09	0.26	0.25	0.035	0.042

Table 5:Oil and protein contents of the cotton seeds as affected by different fertilization treatments.

Vari.	Treat.	Oil %				Protien %			
		2003	2004	Average	Δ increase %	2003	2004	Average	Δ increase %
G. 86	Control	19.45	20.63	20.04		55.13	56.36	55.75	
	UAN	22.15	23.46	22.81	13.81	58.25	59.47	58.86	5.58
	Phosph.	22.83	23.95	23.39	16.72	56.76	58.65	57.71	3.52
	Sulphur	23.20	24.34	23.77	18.61	57.65	59.74	58.70	5.29
L.S.D at 0.05		0.45	0.54			0.72	0.36		
G. 87	Control	18.76	19.58	19.17		53.45	54.65	54.05	
	UAN	20.85	21.64	21.25	10.85	57.34	58.25	57.80	6.94
	Phosph.	20.64	21.95	21.30	11.11	56.83	57.94	57.39	6.18
	Sulphur	21.35	21.87	21.61	12.73	58.47	58.85	58.66	8.53
L.S.D at 0.05		0.41	0.49			0.69	0.75		
G. 88	Control	20.24	20.85	20.55		56.62	57.45	57.04	
	UAN	21.37	22.42	21.90	6.57	59.24	59.95	59.60	4.49
	Phosph.	20.72	21.67	21.20	3.16	60.35	60.87	60.61	6.26
	Sulphur	20.95	21.36	21.16	2.97	60.59	61.15	60.87	6.71
L.S.D at 0.05		0.43	0.48			0.75	0.89		
G. 87	Control	18.95	19.65	19.30		56.24	57.25	56.75	
	UAN	21.63	22.45	22.04	14.20	58.65	59.52	59.09	4.12
	Phosph.	22.32	22.57	22.45	16.32	57.84	58.65	58.25	2.64
	Sulphur	22.15	22.48	22.32	15.65	58.23	58.95	58.59	3.24
L.S.D at 0.05		0.48	0.51			0.85	0.85		



Fig(1):Relationship between seed cotton yield (KentarFed^{-1}) and Fertilizer treatments during 2003 and 2004 seasons.

CONCLUSION

Going through the data, it may be inferred that results lead further support to the contention that nefits resulting from the use of UAN, phosphorien and sulphur individual with NPK (70 N + 30 P_2O_5 + 24 K_2O kg fed^{-1}) are added to the cotton plants and the pH was lowered and reflected in increasing the availability of soil nutrients and beneficial for better yield.

REFERENCES

A. O. A. C. (1970). "Association of Official Analytical Chemists. Official Methods Washington, D.C., P. 138.

Abdel-Magid, A. A. (2002). Effect of biofertilizers, micronutrients and NPK fertilization on cotton yield. J. Agric. Mansoura Univ., 27(4): 2703-2712.

Abdel-Reheem, M. A.; E. N. Gendy and F. G. Younes (1991). Effect of phosphorus and zinc application on some plant constituents and yield of dandra cotton variety grown on alluvial soils. Egypt. J. Agric. Res., 69(2): 455- 464.

Aulakh, M. S. and N. S. Pasrisha (1977). Interaction effect of sulphur and phosphorus on growth and nutrient content of Moong (Phaseolus aureus, L.). plant and soil, 47: 341 – 350.

Bayoumi, N. A.; M. M. El-Seidy; M. M. Shehata and S. S. Mohamed (1985). A study on some factors affecting sulfur transformation in soil and its uptake by garlic plants. Minufiya, J. Agric. Res. Vol. 10, NO.4: 2605-2621.

Eid, M. T. and M. R. Hamissa (1969). Nitrogen fertilization for cotton. Congress Book Supreme Council of Soil. Cairo.

El-Aggory, E. M.; S. Allam; N. O. Monged and A. Kh. Ahmed (1996). A comparative study on using biofertilizers and micronutrients to reduce the rate of mineral N-fertilizer for wheat plant on sandy soil. Egypt J. Appl. Sci. 11:286-300.

El-Akabawy, M. A.; S. M. M. Allam and N. O. Monged (2000). Some nutritional studies on cotton plant. Egypt J. Appl. Sci.; 15 (7): 34-43.

Gomez, K.A. and A.A. Gomez (1984). Statisticall Procedures for Agricultural Research. 2nd Ed. John Wiley and Sons, pp. 680.

Goos, R. J. (1985). Identification of ammonium thiosulfate as a nitrification and urease inhibitor. Soil Sci. Soc. Amer. J., 49: 232- 235.

Hesse, P. R. (1971). A Text Book of Soil Chemical Analysis. John Murry (Publishers) Ltd., 50 Albemarle Street, London.

Hilal, M. H.; R. Al-Badrawy and F. Abdel-Kerim (1979). Use of elemental sulphur in the reclamation of saline and alkaline soils of Iraq. First symposium on soil reclamation in Iraq. Baghdad, 26-28 March.

Jackson, M. L. (1967). Soil Chemical Analysis. Prentice Hall of India, New Delhi. Pp. 144-197.

Kater Hake, Ken Cassman and Wanyne Ebelhar (1991). Cotton nutrition-N, P and K. Physiology today, Newsletter of the cotton physiology education program-National cotton council of America, Vol. 2, NO.3.

Koinov, J. and P.S Petkov (1976). The effect of fertilizers on some biological characteristic of P. Valgaris. Field Crop Abst. 29: 39-62.

Mathers, E. C. (1970). Effect of ferrous sulphate and sulphuric acid on grain yield of sorghum. Agron. J. 62: 555- 556.

Nasseem, M, G. and A. K. Nasr Allah (1981). The effect of sulfur on the response of cotton to urea under alkali soil conditions in pot experiments. Plant and soil, 62: 255-265.

Neptune, A. M. L.; M. A. Tabatabai and J. J. Hanway (1975). Sulfur fractions and carbon-nitrogen phosphorus relationships in some Brazilian and Iowa soils. Soil Sci. Soc. Amer. Proc. , 39: 51-55.

Ragaa, O. O. (1976). Studies on lint, seed development and oil and protein synthetic in Egypt cotton seeds. Plant Lab. National Research Center, Egypt. Egyptian Cotton, Gazette Jan.

Peterpurgski, A. V. (1968). Handbook of agronomic Chemistry. Kolos publishing House, Moscow (In Russian). PP. 29-68.

Yassen, A. I. H.; A. Y. Negm and A. A. Hosny (1990). Effect of increasing population density and nitrogen on growth yield and nitrogen on growth yield of Giza 76 cotton variety. Annals of Agric. Sci., Fac. Agric., Ain Shams Univ., Cairo, Egypt. 35(2): 761

أثر إضافة اليوريا أمونيوم نترات والفوسفورين والكبريت الزراعي على بعض مكونات النبات ومحصول بعض أصناف القطن

سامي عبد الحميد حماد* - عبد المجيد أبوالمعاطي عبد المجيد ** - حسن جمعه أبوالفتوح** ومحمد حبيب المنسي.***

*قسم علوم الأراضي - كلية الزراعة- جامعة المنصورة ،

**قسم بحوث تغذية النبات- معهد بحوث الأراضي والمياه والبيئة-مركز البحوث الزراعية

*** معهد الكفاية الإنتاجية - جامعة الزقازيق

أجريت تجربتان حقليتان في حقول المزارعين بمركز شربين -محافظة الدقهلية- خلال موسمي ٢٠٠٣، ٢٠٠٤م لدراسة تأثير إضافة اليوريا امونيوم نترات والمخصب الحيوي فوسفورين وكذلك الكبريت الزراعي مع استخدام مستوى السماد النتروجيني والفوسفور والبوتاسيوم ٧٠+ ٣٠ + ٢٤ كجم/فدان ، وذلك على تحسين انتاجية وجودة محصول أربعة أصناف القطن ، وهي جيزة ٨٦ ، جيزة ٨٧ ، وجيزة ٨٨ ، وجيزة ٨٩.

وقد أوضحت النتائج التي تم الحصول عليها كما يلي:

١- استخدام سماد اليوريا أمونيوم نترات رشا على النباتات أدى إلى الحصول على أعلى زيادة في محصول القطن المزهر للفدان.

٢- استخدام سماد اليوريا أمونيوم نترات والمخصب الحيوي فوسفورين والكبريت الزراعي مع المعدل الموصى به من النتروجين والفوسفور والبوتاسيوم ٧٠+ ٣٠ + ٢٤ كجم/فدان أدى إلى زيادة انتاجية محصول القطن الزهر و تصافي الحليج و زيادة في طول النباتات ، وزيادة عدد اللوز المتفتح ، وزيادة وزن اللوزة.

٣- أظهرت الدراسة الأهمية الكبرى لاختبارات التربة قبل عمل التوصية السمادية لمحصول القطن.

٤- زيادة نسبة الزيت والبروتين في بذور القطن ، ومحتوى الأوراق كاملة النمو من الأزوت والفوسفور والكبريت عند بداية الإزهار نتيجة استخدام المعدل الموصى به من الأزوت والفوسفور والبوتاسيوم، والرش بسماد اليوريا أمونيوم نترات والمخصب الحيوي فوسفور ين والكبريت الزراعي.

هذه النتائج تؤكد بوضوح مدى فاعلية استخدام رش سماد اليوريا أمونيوم نترات، وإضافة المخصب الحيوي فوسفور ين والكبريت الزراعي مع المعدل الموصى به ن، فو و بو (٧٠+ ٣٠ + ٢٤ كجم/فدان) تحت ظروف الأراضي المصرية مما يؤدي إلى تحسين إنتاجية وجودة محصول القطن للأصناف جيزة ٨٦ ، جيزة ٨٧ ، وجيزة ٨٨ ، وجيزة ٨٩، وكذلك العمل على خفض ال pH للتربة ، مما يؤدي إلى سهولة ويسر انطلاق العناصر الغذائية في التربة.