Minufiya J. Agric. Res. Vol. 34 No.2: 591 - 605 (2009) "http://www.mujar.net"

EFFECT OF APPLICATION METHODS OF SOME MACRONUTRIENTS ON GERMINATION, FLOWERING, PRODUCTIVITY AND QUALITY OF EGYPTIAN COTTON (GIZA 89 CULTIVAR)

S.M. Abdel-Aal, M.E. Ibrahim and Amany A.M. El-Ashmony
Agronomy Department, Faculty of Agriculture, Minufiya University
(Received: Jan. 1 , 2009)

ABSTRACT: *Field experiment was carried out at the experimental Farm ,Faculty of Agriculture, Minufiya University, Shebin El-Kom to study the effect of application methods (soaking and coating of seeds) of some macronutrients (N, P, K, Mg,Ca,S and their mixture) on growth , flowering , yield and its components and fiber quality of cotton (Giza 89 cultivar) during 2005 and 2006 seasons.*

The obtained results showed that, the highest seed germination characteristics (germination %, germination vigor % and germination rate) were obtained by using seeds soaking or coating method with N element followed by P, K, Mg, mixture, Ca and S, respectively.

Application of N element using coating method followed by P and K gave the highest increase in the number of flowers and bolls setting / plant. So, it was more effective in the increase of no. of open bolls / plant, boll weight, seed index, seed cotton yield / plant and seed cotton yield /fed.

The highest values were obtained by using seed coating method with the mixture of macroelements for fiber length and with N element for fiber strength, fiber fineness and oil % in both seasons. However, the highest values of fiber strength were obtained by the application of N element using coating seeds in the first season and soaking seeds in the second season.Reversely, the two application methods of all tested macroelements had no significant effect on lint % in both seasons.

Kew words: *cotton, macroelements, seeds coating and soaking, germination, yield and quality.*

INTRODUCTION

Cotton is considered the most important crop in Egypt. Therefore, many trails were conducted to increase its productivity and improved its quality through proper fertilization by macronutrients. In this concern, many investigators reported that, yield and / or quality of cotton can be improved by the application of macroelements such as N (Wahdan,1980, Randolph *et al*, 1995 and Sabik, 1997), P (Hosny *et al*,1988, Kadry *et al*, 1990 and Analytic,1997), K (Makram and El-Shihawy,1995 and Randolph *et al*, 1995), Ca

(XiaoFang *et al*, 2001 and Tewolde *et al*,2005) and Mg (Tewolde *et al*, 2005) as well as macronutrients mixture (Janeczek *et al*, 2007) .

Nevertheless, the fertilization of cotton plants with macronutrients using the traditional method (soil application) proved to be not ideal and significant because that method led to not only fixation of the nutrients in the soil (especially in heavy clay soil) but also leaching them during frequency irrigation (especially in sandy soil). Therefore, now many attempts were done to use other new application methods of fertilizes such as foliar application, seed soaking, seed coating ... etc. In this respect, many investigators reported that the productivity of cotton plant can be improved by the application of macronutrients by using these methods such as foliar application (wahdan, 1990 and Randolph *et al*, 1995); seed soaking (Hosny *et al*, 1988 and Kadry *et al*, 1990) and seed coating (Seshadri and prased, 1998 and Gormus, 2002).

The aim of this investigation was to study the response of cotton plants to two new application methods (seeds soaking and coating) of six macronutrients and their effects on the productivity and quality of Egyptian cotton (Giza 89 cultivar).

MATERIALS AND METHODS

Field experiment was carried out in the experimental Farm, Faculty of Agriculture, Minufiya university during 2005 season and repeated in 2006 one. This experiment was done to study the effect of two application methods (seeds soaking and coating) of seven macronutrient treatments (N, P, K, Ca, Mg, S and their mixture) compared to control treatment on seed germination, production and abscission of flower and bolls, yield and yield components, and technological characters of Egyptian cotton (Giza 89 cultivar). Each experiment included 15 treatments arranged in randamized complete block design with four replications. The tested treatments were as follows:

1) Control (tap water).
2) Seeds soaking in solution of urea (46.5% N) "N".
3) Seeds soaking in solution of calcium super phosphate (15.5% P_2O_5) "P".
4) Seeds soaking in solution of potassium sulphate (48% K_2o) "K".
5) Seeds soaking in solution of calcium EDTA (10% Ca) "Ca".
6) Seeds soaking in solution of Magnesium sulphate (12%Mg) "Mg".
7) Seeds soaking in solution of micronic sulfur (80 % S) "S".
8) Seeds soaking in solution of mixture of N, P, K, Mg, Ca and S.
9) Seeds coating with urea (46.5% N) "N".
10) Seeds coating with calcium super phosphate (15.5% P_2O_5)"P".
11) Seeds coating with potassium sulphate (48% K_20) "K".
12) Seeds coating with calcium EDTA (10% Ca) "Ca".

13) Seeds coating with Magnesium sulphate (12% Mg) "Mg".
14) Seeds coating with micronic sulfur (80 % S) "S".
15) Seeds coating with mixture of N, P, K, Mg, Ca and S.

With regard to soaking treatments, the cotton seeds were soaked for 24 hours in solution of nutrient elements at a rate of 5 g/ liter water for each tested macroelement and at a rate of 30 g /liter water for their mixture.

With regard to coating treatments, the cotton seeds were damped with a solution of sticker sulistance (Triton B), then mixed with the tested nutrient elements at a rate of 5 g / Kg seeds for each macroelement and 30 g /Kg seeds for their mixture.

Preceding crop was Egyptian clover in the two seasons. Chemical analyses for the experimental field was done at Sakha Agricultural Research Station. Results are presented in Table (1):

Table (1): Chemical properties of the top experimental soil (Average of the two seasons).

A) Chemical properties:

p.H	E.C	S.P %	Soluble cations (meq /L)				Soluble anions (meq /L)			
			Ka^{++}	Mg^{++}	Na^{+}	K^{+}	Co_3^{-}	Hco_3^{-}	Cl^{-}	SO_4
8.15	3.29	81.97	1.20	27.13	22.00	0.50	7.58	21.67	21.67	43.16

B) Available macro and micronutrients:

Macronutrients (ppm)			Micronutrients (ppm)					
N	P	K	Fe	Zn	Mn	Cu	Mo	B
35.39	7.70	235.10	2.91	0.76	3.13	0.98	0.22	0.14

Top soil (30-10) cm.

Each experimental plot consisted of 6 rows, 3.5 m long and 0.6 m width. (plot area = 12.5 m^2). The seeds were sown on 25 and 27 march in the first and second seasons, respectively. All plots were soil fertilized with nitrogen fertilizer at a rate of 60 kg N / fed in the form of urea (46.5 %) in two equal doses, the first dose was added after thinning (before the first irrigation), while the second dose was applied before the second irrigation. Phosphorus fertilizer was soil applied during soil preparation in the form of calcium super phosphate (15.5 % P_2O_5) at a rate of 100 kg /fed.potassium fertilizer was applied after thinning at a rate of 24 Kg K_2o / fed. In the form of Potassium sulphate (48 % K_2O) .

Characters studied:

A) Seed germination characters.

1- Germination %.

Samples of 100 seeds were germinated on towel paper and incubated at 25c° for a period of 7 days. Germination percentage was calculated as follows:

$$\text{Germination \%} = \frac{\text{No. of germinated seeds}}{\text{Total seeds}} \times 100$$

2- Germination vigor %.

Samples of 100 seeds were germinated in coarse sand (3 cm depth) and incubated at 25c° for a period of 7 days. Vigor percentage was calculated as follows:

$$\text{Vigor \%} = \frac{\text{No. of germinated seeds}}{\text{Total seeds}} \times 100$$

3- Germination rate.

Germination rate of seeds were calculated by counting number of seedling emerged during germination period after 4 days from sowing up to four countins (2 days intervals) . It was calculated using the following formula:

$$\text{Germination rate} = \frac{a + (a+b) + (a+b+c) + \ldots\ldots}{(a+b+c+\ldots\ldots)\, n}$$

Where: a = No. of germinated seeds at first count.
b = No. of germinated seeds at second count.
c = No. of germinated seeds at third count.
n = No. of counts.

B) Production and abscission of flowers and bolls.

During flowering period, five plants were marked at random at each experimental plot . The following data was recorded on the main stem and branches per each marked plant.

1) Number of flowers / plant.

2) Number of setting bolls / plant.

3) Abscission flowers / plant % =

$$\frac{\text{No. of flowers / plant} - \text{No. of setting bolls / plant}}{\text{No. of flowers / plant}} \times 100$$

4) Abscission bolls / plant % =

$$\frac{\text{No. of setting bolls / plant} - \text{No. of bolls at harvest / plant}}{\text{No. of setting bolls / plant.}} \times 100$$

5) Total abscission % =

$$\frac{\text{No. of flowers / plant} - \text{No. of bolls at harvest / plant}}{\text{No. of flowers / plant.}} \times 100$$

C) Yield and yield components.

At first pick, random sample of ten guarded plants was taken and labeled from each plot to determine the following characters.

1- Height of first fruiting node / plant. "cm"
2- Number of bolls / plant.
3- Boll weight."g".
4- Seed index (100 - seed weight)."g".

$$5\text{- Earliness \%} = \frac{\text{Seed cotton yield of the first pick}}{\text{Total seed cotton yield (first + second pick)}} \times 100$$

$$6\text{- Lint \%} = \frac{\text{Weight of lint}}{\text{Weight of seed cotton}} \times 100$$

7 - Seed cotton yield / plant."g".
8 - Seed cotton yield / fed. (Kantar, i .e 157.5 kg).

D)Tchenological characters

I-Fiber characters.

Samples of lint were collected from each treatment at each replicate to determine the following characters:

1-Fiber length (mm.): it was determined by the Digital Fibrograph.
2-Fiber fineness (micronaire): it was determined by Micronaire instrument.
3-Fiber strength (pressely index): it was determined by Pressely instrument.

II-Seed quality.

Seed samples were collected from each treatment at each replicate to determine the seed oil % according to the method described by A.O.C.S (1985).

The data obtained for each character studied in each season were statistically analysed according to the methods described by Snedecor and Cochran (1967). The differences between the means of different treatment were tested using the Duncan's Multiple Range method (Duncan, 1955).

RESULTS AND DISCUSSION

(1) Seed germination:

The data in Table (2) showed the effect of application methods of the tested macronutrients on seed germination characters (germination %, germination vigor % and germination rate) in the two growing seasons.The recorded data indicated that the application methods (soaking and coating) of the tested macroelements (N, P, K, Mg, Ca and S) had significant effect for all seed germination traits studied when they were applied separately or

Table (2): Effect of application methods of macronutrients on seed germination characters of cotton (Giza 89 cultivar) during 2005 and 2006 seasons.

characters / Treatments		Germination %	Germination vigor %	Germination rate
2005 season				
	Control	89.82 d	89.07 h	0.822 f
Soaking	N	92.68 ab	92.07 ab	0.894 ab
//	P	92.31 ab	91.81 abc	0.887 abc
//	K	91.62 bc	91.03 a-e	0.878 a-d
//	Mg	91.37 bc	90.40 c-f	0.867 a-e
//	Ca	90.84 c	89.41 fgh	0.850 def
//	S	90.55 cd	89.18 gh	0.830 ef
//	Mix.	90.88 c	89.80 e-h	0.859 b-e
Coating	N	93.20 a	92.80 a	0.899 a
//	P	92.42 ab	91.64 a-d	0.891 ab
//	K	91.89 bc	91.10 a-e	0.885 abc
//	Mg	91.29 bc	90.91 b-e	0.878 a-d
//	Ca	90.71 cd	90.60 c-f	0.859 b-e
//	S	90.56 cd	90.33 d-g	0.852 def
//	Mix.	91.02 bc	90.75 cde	0.865a-e
2006 season				
	Control	88.34 f	90.27 h	0.852 b
Soaking	N	92.71 ab	94.63 a	0.891 a
//	P	92.14 abc	93.66 a-d	0.888 a
//	K	91.37 bcd	92.85 a-f	0.882 ab
//	Mg	90.70 cd	92.30 c-g	0.876 ab
//	Ca	90.13 de	90.97 fgh	0.869 ab
//	S	88.77 ef	90.55 gh	0.865 ab
//	Mix.	90.22 de	91.19 d-h	0.874 ab
Coating	N	93.64 a	94.44 ab	0.897 a
//	P	92.64 ab	94.15 abc	0.889 a
//	K	92.28 abc	93.10 a-e	0.882 ab
//	Mg	91.26 bcd	92.59 b-f	0.876 ab
//	Ca	90.22 de	90.60 gh	0.872 ab
//	S	89.55 def	90.26 h	0.870 ab
//	Mix.	90.00 de	90.98 fgh	0.874 ab

mixed as compared with the control treatment through the two growing seasons. In comparison among the tested macro elements, it can be noticed that the application of N either by soaking or coating method produced the highest values of the germination traits studied followed by P, K, Mg, mixture, Ca and S in a descending order. The superiority of seed germination chanactes studied by N application might by due of to the great impotan of this element in the physiological process inside plants which probably resulted to the tested macronutrients ,it can be detected that seed coating method was superior to seed soaking for these traits studied.

(2) Production and abscission of flowers and bolls.

Data presented in Table (3) showed that total number of flowers and setting bolls/plant were significantly increased by using the two tested application methods of most tested macronutrients either separately or mixed as compared with untreated plants in the two seasons . In comparison among the tested macronutrients , the data show that the highest increase in the number of flowers and bolls setting / plant were recorded by the application of N element using coating method followed by P and K with insignificant differences among them in the two seasons for both characters . Moreover, the data show that the application of all tested macronutrients either by soaking or coating methods reduced the abscission percentage of flowers , bolls and their total, especially N , P and K elements, compared to the untreated plants in both seasons.These results may be due to the fact that the hormonal balance of plant seedling probably changed with nutritional intensity. Thus, the promoting effect of N, P and K on flower production and decreasing the abscission of bolls and this was reflected consequently on increasing the number of setting bolls / plant, mainly attributed to that, N is a component of IAA which inhibits abscission, and cytokinins which mobilize nutrients to developing bolls and probably help prevent senescence and decrease ABA content in leaves. Moreover, P and K elements can change the cytokinins level and have a similar positive effect on photo hormone content in the plant like N fertilization. In this concern, other researchers found that soil application of N led to an increase in the number of flowers / cotton plant (Wahdan, 1980, and Sabik, 1997) as well as boll set % (EL- Sayed and Abd-Alla, 2002).

Table (3): Effect of application methods of macronutrients on number of flowers and number of setting bolls / plant and their abscission percentages of cotton (Giza 89 cultivar) during 2005 and 2006 seasons.

Character / Treatments		No. of flowers / plant	No. of setting bolls / plant	Abscission %		
				flowers	bolls	total
2005 season						
Control		19.88 g	14.98 i	24.64 a	33.10 a	39.46 a
Soaking	N	24.90 ab	19.85 ab	20.24 b	18.41 ghi	34.94 abc
//	P	24.25 abc	19.45 bcd	19.79 c	19.05 ghi	35.26 abc
//	K	23.92 bcd	19.17 c-f	19.82 c	22.21 efg	37.64 abc
//	Mg	21.72 f	18.57 fgh	14.38 ef	27.75 bcd	38.07 ab
//	Ca	21.37 f	18.30 gh	14.28 ef	29.80 abc	39.75 a
//	S	20.07 g	17.97 h	14.89 ef	31.44 ab	38.61 ab
//	Mix.	22.17 ef	18.85 d-g	20.50 b	25.76 cde	36.74 abc
Coating	N	25.32 a	20.12 a	18.65 cd	16.07 i	33.30 bc
//	P	24.47 abc	19.95 ab	18.65 cd	17.12 hi	32.59 c
//	K	24.17 abc	19.67 abc	18.54 cd	19.84 ghi	34.39 abc
//	Mg	23.47 cd	19.07 c-f	18.65 cd	21.50 e-h	37.03 abc
//	Ca	22.95 de	18.87 d-g	17.70 e	24.39 def	37.78 abc
//	S	22.27 ef	18.70 efg	16.03 ef	26.62 cd	38.43 ab
//	Mix.	23.92 bcd	19.30 b-e	19.25 c	20.46 f-i	36.22 abc
2006 season						
Control		23.08 f	18.94 i	17.90 a	25.90 a-d	39.20a
Soaking	N	25.57 a	22.35 b-e	12.60 a-e	17.75 d	28.11de
//	P	25.30 abc	21.71 def	14.50 a-d	18.001d	31.30b-e
//	K	25.14 a-d	21.19 efg	15.40 abc	18.90cd	31.60b-e
//	Mg	24.66 cde	20.73 fgh	15.90 ab	23.80a-d	35.90ab
//	Ca	24.20 e	20.22 ghi	16.40 a	24.30a-d	36.80ab
//	S	23.00 f	19.59 hi	14.40 a-d	25.20a-d	36.20ab
//	Mix.	25.00 a-d	20.97efg	16.10 ab	22.10a-d	34.60abc
Coating	N	25.69 a	23.95 a	6.70 e	21.80 cde	27.20 e
//	P	25.49 ab	23.58 ab	7.48 e	22.85a-d	28.62 de
//	K	25.22 a-d	23.17 abc	7.94 de	23.33 a-d	29.27 cde
//	Mg	24.72 b-e	22.37 b-e	9.47 b-e	26.88abc	33.83 a-d
//	Ca	24.44 de	22.34 b-e	8.58 de	29.59 ab	35.83 ab
//	S	24.21e	21.99 c-f	9.16cde	30.21 a	36.71 ab
//	Mix.	25.00 a-d	22.79 a-d	8.81 cde	25.92 a-d	32.63 b-e

(3) Yield and Yield components:

It is clear from the data recorded in Table (4) that, coating and soaking application methods of the tested macronutrients had significant effect on the cotton yield and its components (height of first fruting node / plant , no. of open bolls / plant , boll weight , seed index , earliness % , seed cotton yield / plant and seed cotton yield /fed.) compared to untreated plants (control treatment) in both seasons.

Moreover, it can be noticed that seeds coating with N element was more effective for increasing each of no. of open bolls/ plant, boll weight, seed index and seed cotton yield per plant and per faddan compared to the other treatments in the two seasons. Such favorable effect of nitrogen element on seed cotton yield may be due to adequate supply of the necessary nitrogen uptake from root zone when the seeds were coated with it which led to more dry matter accumulation and most yield components and consequently increased seed cotton yield. In this respect, other investigators found that seed cotton yield was increased by adding N element as soil application method (Wahdan, 1980, Sabik, 1997, and El-Sayed and Abd Alla, 2002), foliar application method (Wahdan, 1990) and seed coating method (Seshadri and Prased, 1998).

On the contrary, the height of first fruiting node / plant and earliness percentage were significantly decreased when the cotton seeds were coated with or soaked in the tested macronutrients compared to untreated seeds in both seasons.These results may be cleared that the application of tested macronutrients caused more vegetative growth (plant height, no. of vegetative branches and total dry weight / plant) and consequently resulted in delaying maturity. However, in comparison among the tested macroelements, it can be noticed that the application of S element either by seed soaking or coating led to an increase in earliness % compared to other tested macronutrients.This indicates that the cotton plants became more early when their seeds were treated with S element.

The data in the same table show also that the lint% was not significantly affected by soaking or coating methods of seeds in all tested macronutrients compared to untreated seeds in both seasons. In this concern, many investigators reported that application methods of macronutrients had no effect on lint% by soaking method (Hosny *et al*, 1988) and by foliar application (Wahdan, 1990).

(4) Technological characters of fibers and seeds.

It is clear from the data presented in Table (5) that the application methods of the tested macronutrients led to significant increase in all technological characters studied of fibers (fiber length , fiber strength and fiber fineness) as well as seeds(oil %) as compared with that obtained from the control plants in both seasons . The highest values of these characters were

Table (4): Effect of application methods of macronutrient on yield and its components of cotton (Giza 89 cultivar) during 2005 and 2006 season.

Characters / Treatments		Height of first frui.node/ pl.(cm)	No. of open bolls/ plant	Boll weight (g.)	Seed index (g.)	Earliness %	Lint %	Seed cotton yield/pla. (g.)	Seed cotton yield/fed. (kentar)
2005 season									
Control		23.67a	11.85 i	2.07 f	8.86 h	59.76 a	35.46a	22.84 f	6.28 h
Soaking	N	21.97d-g	16.19 b	2.80 ab	10.21ab	54.41b	38.61 a	25.59 ab	8.19 ab
//	P	21.30 hi	15.69 bc	2.65a-d	9.94 cd	55.98ab	36.20 a	25.24 b	7.88 bc
//	K	21.77 f-i	14.87cde	2.50 a-f	9.76 de	56.18ab	38.33 a	25.05 bc	7.59 cd
//	Mg	22.80 bc	13.44fgh	2.30 c-f	9.38 f	56.32ab	36.86 a	24.63 d	7.10 ef
//	Ca	23.37 ab	12.85ghi	2.20ef	9.10 g	57.33ab	36.13 a	24.47 de	6.90 fg
//	S	23.67 a	12.32 hi	2.17 ef	8.96 g	58.04ab	34.49 a	24.29 e	6.56 g
//	Mix.	22.50cde	13.99efg	2.40 b-f	9.56 e	56.96ab	36.55 a	24.29 e	7.35 de
Coating	N	21.85e-h	16.90 a	2.90 a	10.31 a	56.01ab	37.27 a	25.67 a	8.43 a
//	P	21.17i	16.50 a	2.80 ab	10.13 b	56.03ab	37.30 a	25.27 b	8.21 ab
//	K	21.42ghi	15.85 bc	2.70abc	10.03 c	56.38ab	38.73 a	25.00 bc	7.86 bc
//	Mg	22.47cde	14.75cde	2.50 a-f	9.67 de	56.93ab	37.25 a	24.97 c	7.44 de
//	Ca	22.62cd	14.17def	2.40 b-f	9.49 ef	57.74ab	36.12 a	24.85 cd	7.16 ef
//	S	22.77bc	13.72efg	2.27 c-f	9.31 f	56.75ab	35.27 a	24.92 c	6.82 fg
//	Mix.	22.22c-f	15.24bcd	2.60a-e	9.86 cd	56.64ab	38.17 a	25.17 bc	7.73 cd
2006 season									
Control		22.65a	14.03 i	1.60 d	8.94 g	63.02 a	38.81a	23.97 g	7.20 i
Soaking	N	21.92 bc	18.37 ab	2.28 a	10.22ab	61.72 ef	39.64 a	27.97 ab	9.90 ab
//	P	21.68 cd	17.68 a-d	2.22a	10.03abc	61.86 c-f	39.10 a	27.37 b	9.37 bc
//	K	21.85 bc	17.15 b-e	2.18ab	9.91 bc	61.97 b-f	39.64 a	26.61 bc	8.98 cd
//	Mg	22.01 bc	14.26 e-h	2.12ab	9.77 c	62.18bcd	38.10 a	25.80 d	8.35 d-g
//	Ca	22.13 bc	15.28 ghi	1.89bcd	9.48 def	62.25 bc	38.22 a	25.43 e	7.94 fgh
//	S	22.24 ab	14.6 3 hi	1.85 cd	9.12 fg	62.36b	39.04 a	24.72 f	7.56 hi
//	Mix.	22.00 bc	16.32 fgh	2.15ab	9.89 bc	62.10 b-e	39.90a	23.95 g	8.67 cde
Coating	N	21.86 bc	18.69a	2.35 a	10.33 a	61.68 f	38.85 a	28.49 a	9.95a
//	P	21.28 d	17.49 bc	2.30 a	10.22ab	61.64 f	38.61 a	27.99 ab	9.76 ab
//	K	21.73bcd	17.63 cd	2.28 a	9.99abc	61.86c-f	38.13 a	27.43 b	9.35 bc
//	Mg	22.14 bc	16.35 fg	2.22a	9.65 cd	62.01b-f	39.50 a	26.32 c	8.51 def
//	Ca	22.17 bc	15.67 gh	2.19ab	9.58 de	61.92c-f	39.38 a	25.90 d	8.11 e-h
//	S	22.25 ab	15.28ghi	2.14ab	9.47def	62.17bcd	39.09 a	25.41 e	7.77 gh
//	Mix.	21.99 bc	16.38c-f	2.25 a	9.87 bc	61.83def	39.20 a	26.66 bc	8.79 cde

Table (5): Effect of application methods of macronutrient on some technological characters of fibers and seeds (Giza 89 cultivar)during 2005 and 2006 seasons.

Characters / Treatments		Fiber length (mm.)	Fiber strength (pressely index)	Fiber fineness (micronaire)	Oil %
2005 season					
Control		29.93 c	10.30 e	3.00 h	20.85 g
Soaking	N	31.13 bc	10.77ab	3.66 bc	22.22 ab
//	P	30.87 bc	10.62 bcd	3.55 cd	22.05 abc
//	K	30.75 bc	10.57 bcd	3.45 cde	21.87 a-d
//	Mg	30.42 bc	10.48 cde	3.31 def	21.61 cde
//	Ca	30.30 bc	10.43 cde	3.17 gh	21.48 def
//	S	30.08 c	10.34 de	3.11 gh	21.08 fg
//	Mix.	31.43 abc	10.66 bc	3.00 h	21.72 b-e
Coating	N	31.63 ab	10.92 a	3.80 a	22.33 a
//	P	31.38 abc	10.72 abc	3.71 ab	22.17 ab
//	K	31.11 bc	10.65 bcd	3.55 cd	21.98 a-d
//	Mg	30.71 bc	10.58 bcd	3.43 cde	21.65 cde
//	Ca	30.41 bc	10.51 cde	3.39 def	21.46 def
//	S	30.07 c	10.35 de	3.25 fgh	21.34 ef
//	Mix.	31.78 a	10.80 ab	3.03 gh	22.07 bc
2006 season					
Control		32.60 b	9.13 i	4.48 ef	21.70 b
Soaking	N	33.20 a	10.25bc	5.10 a	23.22 a
//	P	33.00 a	9.96de	5.05 ab	23.03 a
//	K	32.90 ab	9.85ef	4.88 bc	22.87 a
//	Mg	32.80 ab	9.66fg	4.75 cd	22.50 ab
//	Ca	32.70 ab	9.47gh	4.55 def	22.37 ab
//	S	32.50 b	9.35hi	4.49 def	20.19 b
//	Mix.	33.30 a	10.12cde	4.35 f	22.71 a
Coating	N	33.50 a	10.56 a	4.59 def	23.25 a
//	P	33.40 a	10.19 bcd	4.92 bc	23.09 a
//	K	33.20 a	10.03 cde	4.81 bc	22.90 a
//	Mg	33.00 a	9.85 ef	4.75 cd	22.49 ab
//	Ca	32.80 ab	9.67 fg	4.72 cd	22.32 ab
//	S	32.90 ab	9.50 gh	4.53 def	22.11 ab
//	Mix.	33.53 a	10.40 ab	4.39 f	22.67 a

obtained by coating seeds with the mixture of macroelements for fiber length (31.78 and 33.53 mm.) and by coating seeds with N element for fiber strength (10.92 and 10.56 as pressely index) and oil (22.33 and 23.25 %) in the first and second seasons , respectively . However, the highest values of fiber fineness as micronaire reading were obtained from application of N element using coating method (3.80) in the first season and using soaking method (5.10) in the second season. It can be conducted from the above mentioned results that these increament might be attributed to the essential role of some macronutrients for increasing the endogenous contents of some essential components as carbohydrates, protiens as well as increasing the activities of some specific enzymes. In this respect, Tewolde *et al* (2005) found that fiber strength, fiber strength and fiber fineness were significantly increased by foliar application with some macroelements (N, P, K, Ca and Mg). Moreover, Sabik (1997) found that oil % was significantly increased by adding N element as soil application.

REFERENCES

A.O.C.S Official and Tentative Methods, 3rd ed.(1985). American Oil Chemists' Society;Champaign, 1L.

Analytic, S. (1997). Nitrogen (N) Basics (Effect of application method of macronutrients on cotton plants).Washington Court House, OH 43160(800):321-1562.(C.F.www.pu-toyama.ac.jp)

Duncan, D.B (1955): multiple ranges and multiple F .testes. Biometrics, 11:1-42.

El-Sayed, E.A and A.A Abd-Alla (2002). Effect of nitrogen and phosphorus fertilization levels on cotton productivity in the new reclaimed sandy lands. Minufiya J.Agric. Res. Vol. 27 (3): 511-523.

Gormus, O. (2002). Effect of rate and time of potassium application on cotton yield and quality in Turkey. Journal of Agronomy and Crop Science Vol 188(6):382-388. (C.F.www.CAT.INIST.com).

Hosny, A.A, W. kadry and H.M.H Mohamed (1988). Effect of seed soaking in some micronutrients and phosphate solution on yield and yield components of Giza 80 cotton variety.proc.2 nd Conf., Agric. Develop. Res, Ain Shams Univ.:173-179.

Janeczek, E, A. Kotecki and M. Kozak (2007). Effect of application methods of N, P and K application on cotton plants in Xinjiang province. Crop Research in Asia: Achivements and Perspective (ACSA): 524-525. (C.F. www.cicr.nic.in.Periodical).

Kadry, W., A.I.H Yasseen, A.A, Hosny and H.M.H. Mohamed (1990). Effect of seed soaking in phosphate solution and plant denisity on yield and yield components on Giza 75 cotton variety. Annals Agric. Sci., Fac. Agric., Ain shams Univ., Cairo, Egypt Vol. 35 (2):723-738.

Makram, E.A. and M.I.El-Shihawy (1995). The effect of potassium fertilization on growth and yield of cotton (Giza 76) grown in saline soils (54). Annals Agric. Sci., Fac. Agric., Ain shams Univ.,Cairo, Egypt Vol.40 (2): 621-628.

Randolph, J.C; G.N.Cameron and P.A.McClure (1995). Effect of some elements by foliar application on cotton plants .Journal of Mammalogy, Vol.76 :(4). (C.F. www.cotton-net.com).

Sabik, F. A. (1997). Effect of some macro and micronutrients on growth and yield of Egyptian cotton.Ph.D.Thesis, Fac.of Agric. (Moshtohor), Zagazig Univ. Egypt.

Seshadri, V. and R. Prased (1998). Effect of nitrogen rates and sources of nitrogen on growth, and methods of application and yield of cotton (*G. hirsutum L.*). Earth and Environmental Science Vol 142, (5): 731-739. (C.F.www.scitec-career.com).

Snedecor, G.W. and W.G.Cochran (1967). Statistical methods. The Iowa state Univ. press, Ames., Iowa, U.S.A.

Tewolde, H; K.R. Sistani and D.E. Rowe (2005). The effect of N, P and Mg on cotton plants in different characters. Journal of plant nutration.28 (4):605-619. (C.F.www.ars.usda.gov/main/site.main.htm?modecode =64-06-15-10).

Wahdan, Gamalat. A. (1980). Studies on the growth of cotton plant in relation to date of planting and nitrogenous fertilizer levels.M.Sc. Thesis Fac.of Agric., Minufiya Univ., Egypt.

Wahdan, Gamalat. A. (1990). Physiological effect of nitrogen as foliar application and some growth regulators on cotton plants.Ph.D. Thesis, Fac.of Agric, Minufiya Univ. Egypt.

XiaoFang, S., Z. QingSong and L. YouLiang (2001). Regulations of salt tolerance of cotton plants at seedling emergence stage by soaking seeds in pix and $CaCl_2$ solutions. Jiangsu Journal of Agricultural Sciences.Vol.16 (4):204-207. (C.F.Field Crop Abstracts Vol.54 (6)4024).

تأثير طرق إضافة بعض العناصر الغذائية الكبرى على إنبات وتزهير وإنتاجية وجودة القطن المصري (صنف جيزة٨٩)

سيد محمود عبد العال ، محمود الدسوقي إبراهيم ، امانى احمد مجد الاشمونى
قسم المحاصيل – كلية الزراعة – جامعة المنوفية– شبين الكوم – مصر

الملخص العربي

أجريت تجربة حقلية في مزرعة التجارب بكلية الزراعة – جامعة المنوفية بشبين الكوم خلال موسمي الزراعة ٢٠٠٥و٢٠٠٦ بهدف دراسة تأثير طرق الإضافة (نقع البذور و تغليف البذور) لبعض العناصر الغذائية الكبرى (نيتروجين- فوسفور-بوتاسيوم-كالسيوم-ماغنسيوم- الكبريت و مخلوط هذه العناصر) ذلك على صفات الإنبات والتزهير والمحصول ومكوناته والصفات التكنولوجية للتيلة والبذرة للقطن المصري(صنف جيزة٨٩) حيث تم نقع بذور القطن في محلول بمعدل ٥ جم لكل عنصر و٣٠ جم من مخلوط العناصر /لتر ماء لمدة ٢٤ ساعة وتم التغليف ببذرة منزوعة الزغب بمعدل ٥ جم لكل عنصر و٣٠ جم من مخلوط العناصر/ كجم بذرة.

* ويمكن إيجاز أهم النتائج المتحصل عليها فيما يلي:-

١- أدى نقع البذور أو تغليفها بعنصر النيتروجين إلى الحصول على اعلي قيم لصفات الإنبات (النسبة المئوية للإنبات- النسبة المئوية لقوة الإنبات – سرعة الإنبات "معدل الإنبات") يليه المعاملة بعناصر الفوسفور والبوتاسيوم و المغنسيوم – مخلوط الأسمدة – الكالسيوم – الكبريت على الترتيب وذلك مقارنة بمعاملة الكنترول (بدون نقع أو تغليف).

٢- تم الحصول على اعلي قيم لعدد الأزهار المتكونة على النبات وعدد اللوز المتبقي على النبات واقل نسبة مئوية لتساقط كل من الأزهار و اللوز وذلك عن طريق نقع البذوراو تغليفها بعنصر النيتروجين يليه الفسفور ثم البوتاسيوم خلال موسمي الزراعة.

٣- أدى إضافة عنصر النيتروجين بطريقة النقع أو التغليف إلى زيادة قيم كل من عدد اللوز المتفتح/ نبات – وزن اللوزة- دليل البذور و محصول القطن الزهر للنبات و للفدان مقارنة

بالعناصر الغذائية الأخرى تحت الدراسة في حين أدى إضافة جميع العناصر الغذائية الكبرى إما منفردة أو مخلوطة باى طريقة من طرق الإضافة المختبرة (النقع أو التغليف) إلى نقص قيم النسبة المئوية للتبكير اى إلى التأخير في النضج مقارنة بالنباتات التي لم تعامل بذورها(الكنترول).

٤- تشير النتائج إلى انه تم الحصول على أعلى القيم لصفة طول التيلة عند تغليف البذور بمخلوط العناصر الكبرى واعلي القيم لصفتي متانة التيلة والنسبة المئوية للزيت وذلك عند تغليف البذور بعنصر النيتروجين خلال موسمي الزراعة ، هذا وقد تم الحصول على اعلى القيم لصفة نعومة التيلة وذلك بإضافة عنصر النتروجين بطريقة التغليف في الموسم الأول و بطريقة النقع في الموسم الثاني ، بينما لم تتأثر النسبة المئوية للشعر تأثرا معنويا بإضافة اى عنصر من العناصر الكبرى وباى طريقة من طرق الإضافة تحت الدراسة مقارنة بمعاملة الكنترول خلال موسمي الزراعة.