Response of Maize Hybrid to Biofertilization, Soil Nitrogen Application and Weed Control

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ABSTRACT

Two field experiments were carried out at the Experimental Farm of the Faculty of Agriculture (Saba Basha), Alexandria University, during 2007 and 2008 summer seasons. This study was conducted to investigate the effect of biofertilization, VA-mycorrhizal inoculation, soil nitrogen application and weed control on growth attributes, yield and yield components of maize hybrid cultivar, namely, three-way cross 310 (T.W. C. 310).

The obtained results indicated that the combined treatment of VAM-fungi, and cerealen bio-fertilizers supported by 105.0 kg N/ha, had positive significant effects on all the studied characters.

The combination of VA-mycorrhizal and biofertilizer of cerealen in addition to a rate of 105.0 kg N/ha, was the best treatment to obtain the highest growth attributes, yield, yield components and weed characters of T.W.C.310.The highest grain yield/ha, total dry weight and weed characters were obtained from hand hoeing twice, atrazine inoculation with VA-mycorrhiza, biofertilizers cerealen and fertilized with 105.0kg N/ha.

Key words: Nitrogen application, T.W.C310, Cerealen, Mycorrhiza, Atrazine, Hand hoeing, Weed control.

INTRODUCTION

Corn (*Zea mays, L.)* is one of the most important cereal crops in Egypt and the world. It is used for bread industry (mix 80% wheat flour with 20%, maize flour) in order to reduce wheat importation and animal feeding. Increasing maize production depends upon many factors. Nitrogen fertilizer level is considered among the most important factors affecting maize plant.

Some growth and yield characters were affected by application of nitrogen fertilizer (Radwan, 1998; Soliman et al.. 2001; El- Moselhy and Zahran, 2003; Nofal and Mobarak, 2003 and Gomaa, 2008).

Biofertilizers drew the attention as a partial part goal alternative to N fertilizer application. In addition, biofertilizers have many advantages i.e. supply part of plant N. requirement by 25%, increase the availability of nutrients, reduce the environment pollution, control the vegetative growth and improve the yield potential (Inderjit and Dakshini, 1997; Chunchun et al., 1998; Saad and Ahmed, 2002; Cocking, 2003 and Gomaa, 2008). Inoculation of corn seeds with VAM mycorrhizae could supply the plants with apart of nitrogen required and could increase grain yield, its attributes and chemical composition (Radwan, 1998; Ahmed et al.. 2003; Virendra and Ahlawat, 2004 and Mekail et al.. 2005).

Weeds are one of the most important factors in maize production. They cause important yield losses worldwide with an average of 12.8% despite weed control application and 29.2% in the case of no weed control (Hussein, 1996 and Mosalem and Shady, 1996).

Therefore, weed control is an important management practice for maize production that should be carried out to ensure optimum grain yield (Dogan et al.. 2004; David et al.. 2005 and Abo Ziena et al . 2008). Weed control in maize is carried out by mechanical and/or chemical methods.

Therefore, the aim of this study was to investigate the response of maize hybrid to biofertilization, soil nitrogen application and weed control on growth and yield of corn plant (*Zea mays, L.).*

MATERIALS AND METHODS

Two field experiments were carried out, at the experimental Farm, of the Faculty of Agriculture. (Saba Basha), Alexandria University, at Abees-Alexandria, - Egypt, during the two successive summer seasons of 2007 and 2008. The experimental design was a split plot with four replicates; the main plots were conducted for the Bio-nitrogen fertilization treatments 1) Uninoculation + 140 kg N/ha, 2) Cerealen + 105.0 kg N/ha, 3) A-mycorrhizae +105.0 kg N/ha and 4) Cerealen + A-mycorrhizae + 105.0 kg N/ha. Nitrogen fertilizer was applied in the form of urea (46% N) was applied at the abovementioned levels after sowing and just before the sowing, seed treatment with mycorrhizae spores, A-mycorrhizae inoculation was prepared and added as described by Radwan (1996). Local strain of *Glomus macrocarpum* was obtained from Plant Production, Department, Faculty of Agriculture (Saba Basha), Alexandria University, Alex., Egypt. Cerealen (*Azospirillum brasilense*) was produced by general Organization for Agric. Equalization. Fund. Ministry of Agriculture. The sub-plots were assigned to four weed control treatments; 1) Unweeded (control), 2) hand hoeing twice, 3) atrazine (Gesapium 80%, W.P.) [2-chloro-4-ethylamino-6-15 opropylamino S-traizain) was applied at a rate of 2.38 kg/ha applied as a pre-

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emergence treatment (A-PE) and 4) Atrazine plus one hand hoeing. The experimental soil was clay loam in texture, poor in organic matter (0.90% with pH 8.0. Available phosphorus was 0.41 mg/kg and available nitrogen was 0.42 mg/kg

Grains of corn *(Zea mays, L.)* hybrid are three ways cross 310 (T.W.C. 310). The sowing dates were 15 May and 1 June in 2007 and 2008 seasons, respectively. The area of each sub-plot was 10.5 m^2 (3 x 3.5 m) with five ridges 60 cm apart, the sowing distance was 30 cm between hills. The normal cultural practices were carried out as recommended in the vicinity.

Fresh root samples, at vegetative growth stage were stained with trypan blue (Phillips and Hayman, 1970). At 55, 75 and 95 days after sowing, ten guarded plants were taken at random from each treatment. The following morphological and growth characteristics were recorded:

1. Plant height (cm).
2. Stem diameter (cm).
3. Leaf area index (LAI).was computed according to the formula of (Watson 1952):

   (LAI) = Unit leaf area / Unit ground area
4. Dry weight/plant (g). Was computed according to drying to a constant

   Weight in forced draft air oven at 70 c and the dry weight was recorded.
5. Crop growth rate (C.G.R.). Was computed according to the formula Suggested by Brown (1984)

   (C.G.R.) = W2-W1/S A (t2-t1) where

   W2, W1 are plant dry weight at time one T1 and time two T2

   Corresponding days.

   SA = the soil area occupied by the plant at each sampling.
6. Relative growth rate (R.G.R.). Was calculated according to the formula of (Watson 1952). (R.G.R.) = Log W2- log W1/t2-t1.

At harvesting the following yield and its components were recorded:

1. Ear length (cm) 2. Ear height (cm)
3. Ear diameter (cm) 4. Number of rows/ear
5. Number of grains/row 6. Weight of grains /ear (g)
7. 100-grain weight (g)8. Grain yield (ton/ha.)

Weed characters were recorded at 55 and 75 days after sowing where weeds were hand pulled from one square meter taken at random in each plot and classified into different species. For each species the number and dry weight of weeds (at 70°C for 48 hours) were recorded.

Data of growth characters, yield components and weed characters were statistically analyzed using split plot design according to the method described by Snedecor and Cochran (1982). The means were compared using L.S.D. values at 5% level.

RERSULTS AND DISCUSSION

A. Effect of fertilization

Data in Tables 1 and 2 showed that plant height, stem diameter, leaf area index, total dry weight, crop growth rate and relative growth rate at the three growth stages in the two growing seasons of 2007 and 2008 were affected by treatment of A-mycorrhizae + 105.0 kg N/ha. The enhancement of nutrient uptake and its translocation increased photosynthetic rate and accumulation of photosynthesis in shoots (Radwan, 1998). These results are in agreement with those obtained by Ahmed et al.. (2003) on faba bean, chickpea and lupine plants, El-Moselhy and Zahran (2003) on barley, Virendra and Ahlawat (2004) on maize Ogut et al.. (2005) on wheat.

Data in Tables (3 and 4) showed that yields obtained by combined treatment (Cerealen + A-mycorrhizae + 105.0 kg N/ha.) were significant higher than those of the other treatments. Ear length, ear height, ear diameter, number of rows/ear, number of grains/row, weight of grain/ear, weight of 100 grain and grains yield (ton/ha), were significantly increased by the combination ; Cerealen + A-mycorrhizae + 105.0 kg N/ha.. The highest values of 100 grain weight were 38.88 and 36.55 g with Cerealen + A-mycorrhizae + 105.0 kg N/ha compared with 37.37 and 33.78 g control+ 140 kg N/ha, in the two seasons , respectively. It can be stated that the treatment: Cerealen and A-mycorrhizae inoculation had promoted the production of maize grains. Similar results were obtained by El-Khawas (1990), Mekail et al.. (2005), Ogut et al.. (2005) and Gomaa (2008) however, once roots emerge at seed germination and are colonized by Arbuscular and microorganisms, energetic pathways such as glycolysis and conversion of conjugate indol acetic acid (IAA) to active IAA are stimulated. Also, the mycorrhizae spores and microorganisms increases the synthesis of the endogenous photo hormones which play an important role in formation of a big active root system that allow more nutrients uptake and hence may promote many of bioactions processes.

Table 1. Effect of bio-nitrogen fertilization and weed control on some growth attributes of maize plant during 2007 and 2008 seasons

Treatments	Plant height (cm)						Stem diameter (cm)						Leaf area index					
	2007			2008			2007			2008			2007			2008		
	Days after sowing			Days after sowing			Days after sowing			Days after sowing			Days after sowing			Days after sowing		
	55	75	95	55	75	95	55	75	95	55	75	95	55	75	95	55	75	95
A)Bio-nitrogen fertilization																		
Control + 140.0kgN/ha	187.56	192.86	230.56	234.98	238.63	247.58	1.90	2.19	2.13	2.18	2.39	2.49	5.02	6.33	5.78	5.62	6.07	6.11
Cerealen+ 105.0KgN/ha	208.33	208.38	241.00	248.61	247.92	252.61	2.13	2.28	2.24	2.27	2.50	2.62	5.30	6.58	6.20	5.72	6.20	6.27
Mycorrhiza + 105. KgN/h	218.21	219.23	246.96	255.69	265.88	255.84	2.34	2.37	2.37	2.37	2.61	2.69	5.61	6.93	6.47	5.81	6.38	6.41
Cerealen + MyC. +105.0KgN/ha	227.78	224.25	241.29	240.64	260.90	251.27	2.09	2.19	2.22	2.28	2.44	2.60	5.78	6.63	6.28	5.67	6.29	6.41
L . S . D . $_{0.05}$	**12.58**	**7.16**	**3.07**	**8.04**	**7.86**	**3.27**	**0.16**	**ns**	**0.15**	**0.09**	**0.07**	**0.07**	**0.35**	**0.58**	**0.38**	**0.16**	**0.23**	**0.13**
B) Weed control (W)																		
Unweeded	181.33	219.58	194.48	192.96	218.98	215.63	1.80	1.95	1.92	1.88	2.12	2.30	4.16	5.33	5.10	4.30	4.93	4.84
Hand hoeing twice	226.61	260.43	217.97	278.73	275.26	284.14	2.44	2.62	2.58	2.62	2.83	2.90	6.33	7.61	7.23	6.95	7.28	7.34
Atrazine	192.16	229.15	208.62	232.74	252.61	240.55	1.88	2.09	2.07	2.09	2.31	2.46	5.00	6.14	5.69	5.12	5.85	5.89
One hoeing +Atrazine	241.78	250.62	223.64	275.49	266.48	266.98	2.35	2.38	2.39	2.51	2.69	2074	6.19	7.39	6.71	6.45	6.88	7.11
L . S . D . $_{0.05}$	**11.76**	**9.57**	**3.39**	**8.12**	**5.70**	**6.15**	**0.32**	**0.20**	**0.16**	**0.12**	**0.11**	**0.20**	**0.27**	**0.57**	**0.32**	**1.01**	**0.54**	**0.24**
Interactions (A×B)	**	ns	**	**	**	ns	ns	ns	ns	ns	ns	ns	*	ns	*	ns	**	ns

Ns: Not significant
* : significant at 0.05 level of probability
** significant at 0.05 level of probability

Table 2. Effect of bio-nitrogen fertilization and weed control on some growth attributes of maize plant during 2007 and 2008 seasons

Treatment	Dry weight / plant (g)						Crop growth rate (CGR) g days /m^2				Relative growth rate (g/g week) (RGR)			
	2007			2008			2007		2008		2007		2008	
	Days after sowing						Days after sowing				Days after sowing			
	55	75	95	55	75	95	(55-75)	(75-90)	(55-75)	(75-95)	55-75	75-95	55-75	75-95
A) Bio-nitrogen Fertilization														
Control + 140.0kg N/ha	186.74	251.00	249.92	149.81	616.21	566.44	3.23	0.97	2.33	1.34	0.124	0.200	0.316	0.263
Cerealen + 105.0 kg N/ha	227.15	284.19	266.67	160.28	661.61	613.41	2.94	1.22	2.51	0.97	0.128	0.231	0.316	0.238
Mycomhizae + 105.0 kgN /ha	288.84	297.89	286.73	169.28	679.44	640.64	1.20	1.13	2.55	0.57	0.129	0.213	0.309	0.194
Cerealen + Myco.+ 105.0kg N/ha	266.04	276.94	269.59	163.51	667.71	625.36	0.77	0.98	2.52	0.54	0.142	0.169	0.311	0.206
L. S. D. $_{0.05}$	**4.17**	**4.45**	**3.43**	**10.07**	**14.90**	**15.89**	**0.91**	**ns.**	**0.02**	**0.002**	**0.005**	**0.0009**	**ns.**	**0.0005**
B) Weed Control (W)														
Unweeded	155.89	178.21	162.78	98.30	429.36	452.99	1.32	0.77	1.66	1.18	0.133	0.231	0.325	0.150
Hand hoeing twice	306.79	338.31	359.03	222.36	798.10	753.65	2.15	1.07	2.88	1.22	0.070	0.156	0.280	0.163
Atrazine	223.24	276.86	246.77	131.84	642.39	566.75	2.71	1.41	5.55	0.88	0.133	0.294	0.346	0.300
One hand hoeing + Atrazine	282.60	316.62	304.42	190.45	755.12	672.45	1.95	0.95	2.82	1014	0.088	0.144	0.301	0.288
L. S. D $_{0.05}$	**4.29**	**2.86**	**3.00**	**7.61**	**20.86**	**19.79**	**1.36**	**ns.**	**0.01**	**0.03**	**0.003**	**0.001**	**0.001**	**0.001**
Interaction (A×B)	**	**	*	*	*	**	**ns.**	**ns.**	**ns.**	*	**	**ns.**	**	**ns.**

Ns : Not significant
* : Significant at 0.05 level of probability
** : Significant at 0.01 level of probability

Table 3. Effect of Bio-nitrogen fertilization and weed control on yield and its components of maize plant during 2007 and 2008 seasons

Treatment	Ear length (cm)		Ear height (cm)		Ear diameter (cm)		Number of rows/ear		No. of grains/row		Weight of grains /ear (g)		100- grains weight (g)		Grain yield (Ton/ha)	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
A)Bio-nitrogen Fertilization																
Control + 140.0kg N/ha	17.46	16.51	123.79	138.99	4.97	4.54	14.03	13.33	39.75	37.03	208.95	198.07	37.37	33.78	7.09	8.98
Cerealein + 105.0 kg N/ha	18.25	17.61	132.03	146.68	5.05	4.62	14.22	13.54	40.09	37.83	217.34	212.94	37.97	34.73	7.73	9.16
Mycomhizne + 105.0 kg N/ha	18.60	18.21	135.51	150.43	5.12	4.83	14.39	13.86	40.66	39.55	225.28	218.94	38.49	36.27	8.25	9.59
Cerealen + Myco. + 105.0 kg N/ha	18.76	18.29	138.36	149.96	5.15	4.71	14.52	14.13	41.14	39.74	231.81	222.30	38.88	36.55	8.61	9.87
L . S. D. $_{0.05}$	**0.39**	**0.36**	**3.21**	**7.11**	**0.15**	**0.28**	**0.23**	**0.28**	**1.09**	**1.87**	**4.00**	**7.36**	**0.77**	**1.37**	**0.12**	**0.16**
B)Weed Control (W)																
Unweeded	16.71	15.94	117.01	138.83	4.85	4.42	13.66	13.19	37.08	31.61	206.95	149.03	33.37	32.23	6.18	7.56
Hand hoeing twice	18.64	18.69	138.89	151.30	5.17	4.84	14.69	14.01	41.81	4154	227.07	244.29	40.09	37.79	8.68	10.63
Atrazine	18.36	17.38	133.91	142.25	5.10	4.62	14.03	13.62	40.55	38.61	219.33	215.51	38.27	33.21	7.83	8.85
One hand hoeing +Atrazine	19.36	18.61	139.88	151.68	5.16	4.82	14.78	14.04	32.21	42.39	230.33	243.34	40.99	38.10	8.99	10.56
L . S. D. $_{0.05}$	**0.32**	**0.78**	**2.66**	**5.79**	**0.11**	**0.14**	**0.25**	**0.35**	**0.95**	**1.83**	**2.44**	**9.05**	**0.95**	**1.82**	**0.11**	**0.25**
Interaction (N × W)	**	*	**ns.**	**ns.**	*	**ns.**	**ns.**	**ns**	**ns..**	**ns.**	****.**	**ns.**	*	**ns.**	****.**	**

Ns : Not significant
* : Significant at 0.05 level of probability
** : Significant at 0.01 level of probability

Table 4. Effect of AV- mycorrhizal, biofertilization, nitrogen application and weed control on number of broad, narrow leaved weeds /m^2 and total weeds / m^2 in 2007 and 2008 seasons

Treatments	Number of broad leaved weeds/m^2				Number of Narrow leaved weeds/m^2				Total Number of weeds /m^2			
	2007		2008		2007		2008		2007		2008	
	Days after sowing				Days after sowing				Days after sowing			
	55	75	55	75	55	75	55	75	55	75	55	75
A)Bio-nitrogen Fertilization												
Control + 140.0kg N/ha	7.19	7.19	8.06	7.18	23.88	28.06	26.69	31.50	31.07	35.25	34.75	38.68
Cerealen + 105.0 kg N/ha	6.25	5.75	6.06	5.38	16.31	25.81	20.94	28.06	22.56	31.56	27.00	33.44
Mycomhizae + 105.0 kg N/ha	4.13	4.19	4.56	4.13	10.38	20.50	13.56	22.44	14.51	24.69	18.12	26.57
Cerealen + Myco. + 105.0kg N/ha	5.25	5.69	5.63	5.63	13.50	19.56	16.81	20.81	18.75	25.25	22.44	26.44
L. S. D. $_{0.05}$	**1.85**	**1.09**	**1.09**	**1.30**	**4.95**	**4.04**	**3.92**	**2.00**	**5.50**	**4.19**	**4.72**	**3.28**
B)Weed Control (W)												
Unweeded	14.25	13.75	14.88	13.13	29.56	38.19	46.00	39.13	43.81	51.94	60.88	52.26
Hand hoeing twice	2.13	2.31	2.20	1.94	2.81	2.81	7.69	4.19	4.94	5.12	10.19	6.13
Atrazine	4.63	5.56	4.94	6.06	21.75	37.75	31.75	39.38	26.38	43.31	33.69	45.44
One hand hoeing +Atrazine	1.81	1.19	2.55	1.81	9.94	15.91	16.88	20.13	11.75	16.38	18.88	22.01
L. S. D. $_{0.05}$	**2.11**	**1.58**	**1.51**	**1.44**	**2.54**	**4.06**	**2.10**	**2.45**	**2.80**	**11.19**	**1.80**	**2.98**
Interactions												
N × W	**ns.**	*	*	*	**	**	**	**	**	**ns**	**	**

Ns : Not significant
* : Significant at 0.05 level of probability
** : Significant at 0.01 level of probability

Table 5. Effect of AV- mycorrhizal, biofertilization, nitrogen application and weed control on Dry weight of broad leaved weeds m^2 (gm) Dry weight of narrow leaved weeds m^2 (gm)and Dry weight of total leaved weeds m^2 (gm)in 2007 and 2008 seasons

Treatments	Dry weight of broad leaved weeds m^2 (gm)				Dry weight of narrow leaved weeds/ m^2 (gm)				Dry weight of total leaved weeds /m^2 (gm)			
	2007		2008		2007		2008		2007		2008	
	Days after sowing				Days after sowing				Days after sowing			
	55	75	55	75	55	75	55	75	55	75	55	75
A)Bio-nitrogen Fertilization												
Control + 140.0kg Nlha	22.32	33.70	23.36	34.23	56.76	168.18	61.61	180.36	79.08	201.88	84.97	214.59
Cerealen + 105.0 kg Nlha	19.12	26.64	17.18	25.20	41.83	161.43	54.15	175.38	60.95	188.07	71.33	200.58
Mycomhizae + 105.0 kg Nlha	13.36	21.03	14.71	20.49	28.37	137.86	30.51	163.75	41.73	158.89	45.22	184.24
Cerealen + Myco. + 105.0 kg Nlha	17.08	28.46	16.53	24.83	32.70	148.52	37.93	160.55	49.78	165.60	54.46	185.38
L. S. D. $_{0.05}$	**6.36**	**3.18**	**2.23**	**3.19**	**8.07**	**14.95**	**6.02**	**4.95**	**10.00**	**16.07**	**6.68**	**6.98**
B)Weed Control (W)												
Unweeded	59.33	82.41	56.95	75.33	69.49	231.61	69.13	238.79	128.82	314.02	126.08	314.12
Hand hoeing twice	1.49	3.78	1.88	3.56	7.82	7.20	16.57	13.78	10.21	10.98	18.45	17.34
Atrazine	9.55	22.04	11.36	22.21	56.13	217.15	61.14	234.54	65.68	239.19	72.50	256.75
One hand hoeing + Atrazine	1.50	1.59	1.59	3.65	25.31	16.02	37.36	192.92	26.81	17.61	38.95	196.57
L. S. D. $_{0.05}$	**6.99**	**5.32**	**3.13**	**3.78**	**16.00**	**12.34**	**8.09**	**5.40**	**6.90**	**12.41**	**3.70**	**6.60**
Interactions												
N × W	*	**	**	**	**Ns.**	**	**	**	**	**	**	**

Ns : Not significant
* : Significant at 0.05 level of probability
** : Significant at 0.01 level of probability

Table 6. Interaction between VA-mycorehizae biofertilization, nitrogen application and weed control on some growth attributes in both seasons

Treatments		Plant height (cm)				Leaf area index			Dry Weight per plant (g)						Crop growth rate (CGR)	Relative growth rate (RGR)	
		2007		2008		2007		2008	2007			2008			2007	2007	2008
		Days after sowing				Days after sowing			Days after sowing			Days after sowing					
		55	95	55	75	55	95	75	55	75	95	55	75	95	75 – 90	55 – 75	55 - 75
Control + 140.0 Kg N/ha	Unweeded	144	183	187	214	3.95	4.85	4.85	124	169	153	91	402	433	1.52	0.140	0.330
	Two hand hoeing	211	193	278	259	6.08	6.55	7.09	239	314	343	218	770	717	2.65	0.080	0.280
	Atrazine	170	189	208	237	4.23	5.61	5.59	153	233	219	113	572	522	2.91	0.170	0.350
	One hoeing +Atrz	222	206	264	243	5.51	6.11	6.75	229	287	283	176	719	593	6.32	0.110	0.310
Cerealen + 105.0 KgN/ha	Unweeded	184	193	194	219	4.12	5.06	4.92	161	180	162	95.9	428	450	1011	0.140	0.330
	Two hand hoeing	222	220	281	270	6.22	7.31	7.19	273	344	355	223	801	755	2.31	0.090	0.280
	Atrazine	185	196	238	245	4.73	5.73	5.85	218	288	241	132	661	569	4.59	0.200	0.350
	One hoeing +Atrz	241	222	280	256	6.14	6.74	6.84	254	323	307	189	755	677	3.86	0.120	0.300
Mycorrhizae + 105.0 KgN/ha	Unweeded	196	200	199	222	4.19	5.27	5.02	172	189	172	105	446	471	1.27	0.130	0.320
	Two hand hoeing	232	226	290	290	6.46	7.62	7.46	380	360	382	227	822	783	1.95	0.100	0.280
	Atrazine	197	220	246	265	5.36	5.83	6.08	269	299	268	143	672	589	4.12	0.170	0.340
	One hoeing +Atrz	246	229	286	284	6.43	7.16	6.97	333	342	323	201	776	717	2.96	0.120	0.300
Cerealen + Myco+ 105.0 KgN/ha	Unweeded	199	201	190	219	4.41	5.24	4.94	165	174	162	100	439	456	0.85	0.120	0.320
	Two hand hoeing	240	232	265	279	6.56	7.45	7.40	333	334	354	219	798	758	1.99	0.050	0.280
	Atrazine	213	227	237	262	5.40	5.58	5.88	252	286	257	138	663	585	3.93	0.030	0.340
	One hoeing +Atrz	256	235	269	281	6.67	6.83	6.95	313	313	303	195	769	701	3.41	0.010	0.300
L.S.D. 0.05		5.88	1.70	4.06	2.85	1.37	1.63	1.72	3.07	1.64	1.78	3.81	10.43	9.90	0.68	0.001	0.007

Table7. Interaction between VA-mycrohizae bio fertilization, nitrogen application and weed control on yield and its components of maize plant during 2007 and 2008 seasons

Treatments		Ear length (cm)		Ear diameter (cm)	Weight of grains/ear (gm)	100-grain weight (gm)	Grain yield (ton/ha)	
		2007	2008		2007		2007	2008
Control + 140.0 Kg N/ha	Unweeded	16.33	14.00	4.75	202.60	33.52	5.68	7.37
	Two hand hoeing	17.48	17.33	5.05	213.23	38.33	7.73	10.35
	Atrazine	17.85	16.80	5.08	206.70	37.05	6.90	8.30
	One hoeing +Atrz	18.20	18.00	5.00	214.28	40.60	8.09	9.97
Cerealen + 105.0 KgN/hao	Unweeded	16.63	16.35	4.85	204.95	33.30	6.09	7.56
	Two hand hoeing	18.83	18.38	5.17	222.40	39.78	8.52	11.44
	Atrazine	18.20	17.18	5.03	217.60	38.10	7.56	8.42
	One hoeing +Atrz	19.35	18.53	5.15	224.40	40.70	8.78	10.21
Mycorrhizae + 105.0 KgN/ha	Unweeded	16.93	16.85	4.88	209.45	33.20	6.44	7.73
	Two hand hoeing	18.95	19.35	5.23	231.40	40.88	9.11	10.78
	Atrazine	18.65	17.65	5.15	225.33	38.50	8.09	8.80
	One hoeing +Atrz	19.88	19.00	5.23	236.15	41.40	9.40	10.99
Cerealen + Myco+ 105.0 KgN/ha	Unweeded	16.98	16.55	4.91	210.80	33.45	6.52	7.54
	Two hand hoeing	19.30	19.80	5.25	242.25	41.38	9.40	9.90
	Atrazine	18.75	17.90	5.15	227.68	39.43	8.80	9.92
	One hoeing +Atrz	20.03	18.93	5.28	246.50	41.28	9.73	11.06
L.S.D. 0.05		0.16	0.39	0.06	1.37	0.47	0.14	0.30

Table 8. Interaction between VA-mycochizae bio fertilization, nitrogen application and weed control on weed traits in both seasons

Treatments		No.of broad Leaved weeds/m^2			No. of Narrow Leaved weeds/m^2			No. of total Weeds / m^2			Dry weight of broad Leaved weeds/m^2(g)				Dry weight of Narrow leaved weeds (g)			Dry weight of total Weeds/m^2(g)			
		2007		2008	2007		2008	2007		2008	2007		2008		2007			2007		2008	
		Days after sowing			Days after sowing			Days after sowing			Days after sowing		Days after sowing		Days after sowing			Days after sowing			
		75	55	75	55	75	55	75	55	55	75	55	75	55	75	75	55	75	55	75	55	75
Control + 140.0 Kg N/ha	Unweeded	16.00	18.50	16.75	39.25	45.50	41.0	47.25	56.5	59.5	64.0	70.65	96.35	75.80	95.05	258	93.1	254	162	318	165	349
	Two hand hoeing	2.75	3.50	2.75	4.25	5.00	7.00	6.75	7.00	10.5	9.50	1.83	5.18	2.73	5.10	12.4	21.6	22.8	15.2	17.6	24.3	27.9
	Atrazine	8.00	7.00	9.00	31.00	41.50	35.50	44.75	37.5	42.5	53.7	14.80	29.53	15.33	31.20	218	87.0	234	94.3	247	102	265
	One hoeing +Atrz	2.00	3.25	2.75	21.00	20.25	23.25	27.25	23.2	26.5	30.2	2.00	3.75	2.58	558	189	44.6	209	44.4	193	47.2	216
Cerealen + 105.0 KgN/ha	Unweeded	13.50	15.00	12.75	28.25	42.75	31.75	41.50	44.0	46.7	55.5	63.20	81.55	55.13	73.93	298	81.3	244	122	330	136	318
	Two hand hoeing	2.50	2.25	1.75	2.50	3.25	5.75	2.25	4.50	8.00	7.00	1.45	3.95	1.40	3.33	10.7	19.3	19.4	11.5	14.7	20.7	22.7
	Atrazine	6.00	5.00	5.25	24.00	42.75	29.75	45.50	29.5	34.7	50.7	10.63	20.08	10.68	20.20	238	75.5	247	68.6	258	86.2	267
	One hoeing +Atrz	1.00	2.00	1.75	10.50	14.50	16.50	20.00	12.2	18.5	21.7	1.20	0.98	1.53	3.35	148	40.4	190	34.0	149	41.9	194
Mycorrhizae + 105.0 KgN/ha	Unweeded	11.25	12.00	10.75	21.75	36.50	22.75	36.50	33.0	34.7	47	45.68	64.38	47.20	63.45	222	41.7	232	102	286	88.9	296
	Two hand hoeing	1.25	1.50	1.00	1.25	1.25	3.50	3.25	2.50	5.00	2	0.65	2.23	1.23	1.48	2.78	12.9	10.1	5.38	5.00	14.2	11.6
	Atrazine	3.75	3.75	4.00	14.25	33.00	19.50	34.25	17.2	23.2	4.25	6.30	17.08	9.70	15.88	186	36.8	229	45.4	203	46.5	245
	One hoeing +Atrz	0.50	1.00	0.75	4.25	11.25	8.50	15.75	5.25	9.50	38.2	0.80	0.43	0.73	1.18	146	30.4	182	13.7	140	31.1	183
											16.5											
Cerealen + Myco+ 105.0 KgN/ha	Unweeded	14.25	14.00	12.25	29.00	28.00	29.00	31.25	41.7	43.0	44.5	57.80	87.38	52.68	68.90	203	60.3	224	121	290	113	292
	Two hand hoeing	2.75	2.75	2.25	3.25	1.75	4.50	1.50	5.75	7.25	3.75	2.05	3.78	2.18	4.35	2.83	12.3	2.65	8.68	3.85	14.4	7.00
	Atrazine	4.50	4.00	6.00	17.75	33.75	22.50	33.00	21.25	26.5	39.0	6.48	21.48	9.75	21.55	225	45.1	226	54.2	247	54.8	248
	One hoeing +Atrz	1.25	1.75	2.00	4.00	14.75	11.25	17.50	6.25	13.0	19.5	2.00	1.23	1.35	4.50	162	33.9	188	15.5	163	35.5	193
L.S.D. 0.05		0.79	0.75	0.72	1.27	2.03	1.05	1.23	1.40	0.90	1.49	3.50	2.66	1.57	1.89	6.17	4.04	2.70	3.95	6.21	1.85	3.70

With regard to the effect of biofertilization on the total number of broad-leaved or grassy weeds and total dry weight of the same characters the obtained data indicated that there were significant differences between the three bio-nitrogen treatments in both seasons. While, the A-mycorrhizal- + 105.0 kg N/ha significantly decreased total number of broad-leaved and grassy weeds, total dry weight of brood-leaved or grassy weeds at the two survey after sowing as compared with the unfertilized (control) in both seasons. Similar, results were reported by El-Bially (1995) and Radwan (1998).

B. Effect of weed control

Tables 1 and 2 showed that the growth attributes characters responded significantly to weed control treatments at different growth stages in both seasons. The following three treatments: atrazine + one hand hoeing; hand hoeing twice and atrazine as pre emergence herbicide had higher growth character than the unweeded treatment at three growth stages in the two seasons. These results are in agreements with those obtained by Shaban ***et al.***. (1990), El-Bially (1995) and Mosalem and Shady (1996), while Schans and Weide (1999) and Abdel-Samie (2001) obtained maximum growth attributes by hand hoeing twice.

There were significant increases in the average of yield and its components with each weed control treatments in both seasons (Table 3). The one hand hoeing + Stane gave the highest grain yield ((3.78 and 4.44 ton/ha) in the first and second season, respectively), while the untreated (control) gave the lowest grain yield. There results indicated that hand hoeing twice and a combination of pre emergence herbicides application with one hand hoeing ensure a broad spectrum for weed control over a longer period of time. To provide a long-term weed-free environment for maize, soil herbicides are applied in many cases and mechanical control and post-emergence herbicide applications are often repeated several times .Similar trend was reported by Hussein (1996), Digits (1997) and Jat ***et al.***. (1999) who stated that yield of maize was significantly increased by hand weeding and pends methalin. Knezevic ***et al.***. (2003) reported that band spraying with standard treatment at a half-recommended rate (atrazine 1.5 litter/fed), combined with mechanical weed control brought a satisfactory total weed reduction (83-87%).

Average total number of broad and grassy weeds and total dry weight of weeds as affected by weed control treatments at the two growth stages are shown in Tables 5 and 6 in both seasons. All weed control treatments significantly decreased the average total number weeds and dry weight of weeds at all sampling dates compared with unweeded check. Atrazine has been used for many seasons as major herbicide for weed control in maize in the whole world. The use of atrazine as a major herbicide for maize can be attributed to the great selectivity of this herbicide towards maize composed with other herbicide used in maize field. The selectivity of atrazine in controlling weeds may be attributed to the effect of atrazine in inhibiting photosynthesis, RNA synthesis and lipid synthesis in susceptible cells but not resistant cells.

The reduction in total dry weight of weed per unit area under weed control treatment as attributed to the decrease in the number of broad and marrow leaves weeds. These results agree with those obtained by Khan ***et al.***. (1999), Abdel-Samie (2001), Lesnik (2003), Nosratti ***et al.***. (2007) and Abou Ziena et al. (2008).

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الملخص العربي

إستجابة هجين الذرة الشامية للتسميد الحيوي والتسميد الأرضي بالنتروجين ومقاومة الحشائش

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أقيمت تجربتان حقليتان في المزرعة التجريبية البحثية لكلية الزراعة- سابا باشا- جامعة الإسكندرية بالقرية العاشرة بمنطقة أبيس خلال موسمي ٢٠٠٧، ٢٠٠٨ .تدف الدراسة لدراسة تأثير التسميد الحيوي والتلقيح بالميكوريزا والتسميد الأرضي بالنتروجين ومقاومة الحشائش على صفات النمو والمحصول ومكوناته لهجين الذرة الشامية (هجين ثلاثي (T.W.C. 310).

توضح النتائج المتحصل عليها أنة يمكن الإشارة إلى أن التلقيح بالميكوريزا أو المعاملة بالسماد الحيوي السيريالين والتسميد الأرضي للنتروجين بمعدل ١٠٥كجم/هكتار أثرت معنويا على كل الصفات المدروسة .وكان التوليف بين التلقيح بالميكوريزا والتسميد الحيوي بالإضافة إلى التسميد الأرضي بالنتروجين بمعدل ١٠٥/هكتار كانت أفضل المعاملات للحصول على أعلى صفات نمو والمحصول ومكوناته ومكافحة الحشائش للهجين الجديد الثلاثي (T.W.C. 310).وقد وجد أن أعلى محصول حبوب/هكتار، ومكافحة الحشائش حصلنا عليه من عزقتين والمعاملة بمبيد الحشائش Atrazine والتلقيح بالميكوريزا والتسميد الحيوي بالسيريالين والتسميد الأرضي بالنتروجين ١٠٥ كجم ن/هكتار.