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EFFECT OF INTERCROPPING MUNGBEAN WITH MAIZE ON YIELD AND YIELD COMPONENTS

BY

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ABSTRACT

Two field experiments were conducted in 2003 and 2004 seasons in the farm of Sers El-Lian Agricultural Research Station, A.R.C. Minufiya Governorate, A.R.E. to evaluate three maize varieties under three levels of nitrogen fertilizer and intercropping maize with mungbean at different patterns and their effect on, yield and its components of the two crops. The results can be summarized as follows:

- T.W.C. 321 variety gave the highest ear length and ear weight whereas S.C. 10 variety surpassed significantly the other maize varieties in ear diameter, shelling percentage, 100-grain weight and grain yield/fed.
- Nitrogen application up to 140 kg N/fed caused a significant increase in ear characters, 100-grian weight and grain yield/fed.
- Intercropping pattern 2: 1 significantly surpassed the other patterns in yield and yield components of maize S.C. 10 maize variety with 140 kg N/feddan when intercropped with mungbean under 2:3 pattern gave the greatest grain yield /feddan.
- Mungbean plants when grown with T.W.C. 321 maize variety gave the highest number of pods and seeds/plant seeds/plant whereas; when intercropped with S.C.10variety exceeded seed yield/fed
- Yield and yield components of mungbean were increased by increasing N level. The increase in N level from 100 to 120 up to 140 kg N/fed increased seed yield by 14.67 and 26.78%, respectively in the first season and 7.58 and 18.67%, in the second season.
- Intercropping pattern of 2:1 surpassed significantly the other patterns in number of pods and seeds/plant and 100-seed weight in the two seasons. Intercropping pattern of 2: 3 gave the maximum seed yield/fed The increases were 34.56 and 15.43% in the first season over those grown in 2: 1 and 2: 2 pattern, respectively and 47.68 and 16.79% in the second season .
- S.C. 10 or T.W.C 321 maize varieties with applied 140 kg N/feddan under 2:3 patterns gave the greatest seed yield of mungbean.

INTRODUCTION

Intercropping maize with mungbean may allow better utilization of available environmental parameters.

Yield and yield components of maize and mungbean were significantly differed between maize varieties (Aly *et al.*, 1996; Said and Gabr, 1999; EL-Danasoury, 2003 and Lamlom, 2006) .

Increasing nitrogen fertilizer level up to 150 kg N/feddan caused a significant increase in yield and yield components of maize and mungbean or soybean when intercropping maize with soybean or mungbean. (Aly *et al.*, 1996; El-Habbak and Shams El-Din, 1996; Attia *et al.*, 1999; El-Douby and Allam, 2001, Shams, 2002; Panda *et al.*, 2003 and Mohmadain, 2004)

Maize grown at the same row with soybean had the lowest yield and yield components of maize as compared with the other intercropping patterns (1:1, 1:3 and 2:2 maize /soybean) obtained by EL-Danasoury (2003) and Lamlom (2006). Also EL-Douby *et al.* (1996) showed that yield and yield components of soybean grown on 2:4 pattern were significantly higher than those grown in 2:2 pattern.

Therefore the present investigation was assigned to determine the most favourable pattern of intercropping mungbean with maize with different maize varieties and N-levels

MATERIALS AND METHODS

Two field experiments were carried out in the farm of Sers El-Lian Agricultural Research Station, A.R.C., Minufiya Governorate, A.R.E. during 2003 and 2004 growing seasons to investigate the effect of intercropping mungbean (*Vigna radiata* L. wilezek) at different plant densities with three maize varieties (*Zea mays* L.) and nitrogen fertilizer levels on some yield and yield components

The soil type was clay with pH 8.1 and 7.40 in the first and second seasons, respectively. The chemical properties of the Experimental Farm are shown in Table (1)

Table (1): Some chemical properties of the experimental soil.

Seasons / Chemical analysis	Units	2003	2004
Organic matter	%	1.25	1.46
PH		8.10	7.40
$CaCO_3$	%	3.60	3.90
Ca^{++}	meq/L	6.40	7.80
Mg^{++}	meq/L	2.30	2.60
Na^{+}	meq/L	7.65	8.90
HCO_3^{-}	meq/L	3.09	3.02
Cl^{-}	meq/L	5.03	6.04
$SO_4^{=}$	meq/L	9.60	10.40
Total N%	%	0.20	0.18
Total P ppm	Ppm	5.27	5.16
Total K ppm	ppm	340	352

Each experiment included 31 treatments which were the combination of three maize varieties, three levels of nitrogen fertilizer and three patterns of intercropping as well as three treatments of pure stand for maize cultivars and one

treatment of pure stand for mungbean, The experimental design was split-split plots with four replications. Maize varieties(single cross 10, three way 321 and Giza 2) were distributed at random within main plots. Three N levels(100, 120 and140 kg N/fed) were arranged to the sub plot and The three patterns of intercropping were assigned in the sub-sub plots

Nitrogen fertilizer was applied in the form of ammonium nitrate (33.5% N) at two equal portions. One half was applied before the first irrigation and the other half before the second one.

The three patterns of intercropping were assigned in the sub-sub plots. Maize was grown on both sides of the ridge (140 cm), 30 cm between hills with three patterns of intercropping as follows:
1- Mungbean was grown on the middle ridge (2: 1 pattern).
2-Mungbean was grown in the two rows on the ridge, (2: 2 pattern).
3-Mungbean was grown in the three rows on the ridge, (2: 3 pattern).

Mungbean was sown on May 24 and 20 in 2003 and 2004 seasons, respectively. While maize cultivars were sown at 7 and 3 June in both seasons, respectively. The area of each plot was 21 m2 (3 x 7 m) with 5 ridges, 140 cm apart and 3 m in length. Thinning took place before the first irrigation of maize to two plants for mungbean and one plant for maize per hill.The other normal cultural treatments of growing maize and mungbean plants were practices.

Maize characters, ear length (cm), ear diameter (mm), ear weight (g) calculated by dividing the weight of ears per sub-sub-plot by their numbers, shelling percentage, weight of 100-grain (g), obtained from the average of five samples taken at random from each. Grain yield of maize (ardab*/fed.) calculated on whole plot basis after adjusted at 15.5% moisture content.

Mungbean characters data recorded at harvest were number of pods / plant, number of seeds / plant, weight of 100-seeds (g) and seed yield (kg/fed.).

Data were subjected to the analysis of variance of split-split-plot design as described by Steel and Torrie (1980). The L.S.D. was used to determine the significance of the differences between treatments. The SAS staistical analysis programs was used in this connection.

RESULTS AND DISCUSSION

1-Maize varietal differences:

A- Maize characters

Results showed that the differences among the mean values of ear characters namely; ear length, ear diameter, and ear weight as affected by maize varieties were significant in the two growing seasons (Table 2).The difference between S.C.10 and T.W.C. 321 maize varieties for and ear weight were insignificant in both seasons. On the contrary, the lowest values of ear characters under study were produced from Giza 2 maize variety in the two growing seasons. The increase in ear weight of S.C.10 and T.W.C. 321 maize varieties may be due to the increase in ear length, and ear diameter.

These results are in fit with the results obtained by Aly *et al.* (1996), Said and Gaber (1999)and El-Danasoury (2003).

S C 10 maize variety significantly surpassed the other maize varieties in shelling percentage in the second season only. These results may be due to the fact that this character is genetically controlled. The same trend was reported by Said and Gabr (1999)

The data illustrated in Table (2) show that the average values of 100-grain weight and grain yield / feddan were significantly affected by the three maize varieties under study in the two growing seasons. S.C.10 maize variety out yielded T.W.C.321 and Giza 2 maize varieties by 3.05 and 12.68%, respectively in the first season.While it was 1.89 and 16.20%, respectively in the second season. The superiority of the hybrid varieties is mainly due to the increase in yield components indicated by several investigators, El-Danasoury (2003) and Lamlom (2006).

B- Mungbeen Characters

Numbers of pods and seeds per plant were significantly higher when mungbean plants intercropped with T.W.C. 321 maize variety than with S.C.10 and Giza 2 maize varieties in the two growing seasons. Whereas no significant differences were obtained between S.C.10 and Giza 2 maize varieties in number of pods and seeds/plant of mungbean as shown in Table (2). This may be due to more competition for light and nutrients. These results were in harmony with these finding of El-Danasoury (2003) and Lamlom (2006).

The data in Table (2) showed insignificant effect on weight of 100-seeds as affected by intercropping in the two growing seasons. That effect may be due to less competition between the three maize varieties on 100-seed weight of mungbean. of mungbean plants intercropped with S.C.10 maize variety exceeded mungbean intercropped with T.W.C.321 and Gize 2 maize varieties by 35.92 and 26.28 kg fed in the second respectively . These differences may be due to the genetical differences between maize varieties .These results agreed with those reported by Lamlom (2006).

2- Effect of nitrogen level:

A – Maize Characters:

Nitrogen application up to 140 kg N/fed caused a significant increase in the ear characters, and grain yield/ fddan in both seasons are presented in Table (3). The increase of ear weight with adding nitrogen fertilization might be due to the role of N in activating the development of grains owing to the great amount of metabolites synthesized in the plants and translated in the ears reflected increases in ear length, thus leading to increase in grains weight .These results agree with several results obtained by Attia *et al.* (1999) and Shams (2002).

The application of 120 and 140 kg N/fed increased the grain yield over the control treatment (100 kg N/fed.) by 8.21 and 21.59%, respectively in the first season,. The corresponding significant increase in grain yield in the second season were 4.89 and 15.43%, respectively. The present results mentioned clearly that the increase in grain yield due to application of higher level of nitrogen fertilizer may be attributed to the increase in yield components. These results are in agreement with those mentioned byAttia *et al.* (1999), Shams (2002)and Lamlom (2006).

Table (2): Effect of maize varieties on yield and yield components of maize and mungbean during 2003 and 2004 season

Crops	Maize						Mungbean			
Characters	Ear length (cm)	Ear diameter (cm)	Ear weight(g)	Shelling %	100- grain weight(g)	Grain yield /fed (ardab)	No of pods/plant	No of seeds/plant	100-seed weight(g)	Seed yield / fed (kgs
Maize varieties	2003 Season									
S.C.10	22.13	49.06	287.53	78.03	44.05	18.37	31.33	305.21	4.43	488.00
T.W.C 321	22.26	47.80	284.83	78.36	43.44	17.81	33.64	333.45	4.45	490.03
Giza 2	19.02	39.71	231.28	78.31	36.11	16.04	30.95	294.25	4.43	477.09
L.S.D at 5%	0.,27	1.43	11.36	N.S	1.11	0.38	0.79	19.74	N.S	N.S
	2004 season									
S.C.10	22.63	45.69	277.33	79.25	44.71	19.07	30.93	306.77	4.44	432.90
T.W.C 321	21.84	44.30	268.36	78.61	43.68	18.71	34.03	341.34	4.45	396.98
Giza 2	19.14	37.62	183.42	77.86	37.59	15.98	30.31	300.26	4.38	406.62
L.S.D at 5%	0.63	1.28	11.40	0.82	1.36	0.23	0.67	16.16	N.S	18.25

Table (3): Effect of N- levels on yield and yield components of maize and mungbean during 2003 and 2004 season

Crops	Maize						Mungbean			
Characters	Ear length (cm)	Ear diameter (cm)	Ear weight(g)	Shelling%	100- grain weight(g)	Grain yield /fed (ardab)	No of pods/plant	No of seeds/plant	100-seed weight(g)	Seed yield / fed (kgs)
N-levels (kg/fed)	2003 season									
100	20.84	42.78	231.06	78.42	38.16	15.84	28.11	245.33	4.03	456.18
120	20.81	45.56	266.47	78.08	41.04	17.14	31.64	301.92	4.47	488.67
140	21.76	48.13	297.11	78.19	44.41	19.24	36.17	385.75	4.80	540.28
L.S.D at 5%	0.28	0.84	7.70	N.S	0.60	0.27	0.86	11.50	0.06	18.08
	2004 season									
100	19.70	39.11	225.00	78.53	39.18	16.78	27.94	249.06	4.27	379.01
120	20.95	42.19	241.97	78.53.	41.48	17.60	32.24	318.22	4.40	407.74
140	22.96	46.31	262.14	78.67	45.32	19.37	35.12	380.30	4.60	449.75
L.S.D at 5%	0.60	0.66	4.49	N.S	0.53	0.30	0.69	12.95	0.97	5.07

B – Mangbeen characters:

Results in Table (3) showed that numbers of pods, seeds / plant, and seed yield / fed were significantly increased by increasing N-level from 100 to 120 up to 140 kg N/feddan in both seasons. Application of 140 kg N/fed to mungbean plants with intercropping maize plants gave the highest values for these characters. The results might be due to the fact that N fertilization plays an active role in cell division and metabolic activity as well as vegetative growth, which reflected increases in seed full and resulted heavier seeds. Similar results were found by El-Douby and Allam (2001) and Pand *et al.* (2003).

3- Intercropping patterns:

A – Maize Characters

Ear length and shelling were not varied significantly affected by intercropping patterns in both seasons as shown in Table (4). Characters of ears i.e. ear diameter and ear weight were significantly affected by intercropping patterns in one season out of two. Pattern 2: 1 gave the highest values of ear diameter ear weight and 100 – grain weight. These may be due to the low competition, better utilization of the available growth factors and increase in the photosynthesis activity and the amount of metabolites synthesized under 2: 1 intercropping pattern. Similar results were obtained by El-Danasoury (2003) and Lamlom (2006)

The data collected in Table (4) clearly indicated that intercropping patterns significantly affected grain yield per feddan in one season out of two. The intercropping pattern of 2: 1 produced the highest grain yield/fed as compared with the other intercropping patterns. These increases may be due to more light penetration reflected the better vegetative growth and most yield components such as number of grains per row, ear weight nd 100-grain weight resulted increases in grain yield/fed. These results are in harmony with those obtained by), Abdalla *et al.* (1999)El-Danasoury (2003) and Lamlom (2006).

B- Mungbeen characters:

The data in Table (4) indicated that the intercropping pattern of 2:1 surpassed significantly the other patterns in the numbers of pods and seeds/ plant and weight of 100-seeds in the two growing seasons. On the other hand, the lowest of these characters were showed with intercropping maize and mungbean in 2: 3 pattern. This reflected more shading by tallest maize plants than mungbean plants and more interspecific competition than those intercropped mungbean in one row. Similar results were found by Attia *et al.* (1999), Abd El-Lateef (2000), El-Dansoury (2003), Mahamdain (2004) and Lamlom (2006)

The highest seed yield of mungbean/ fed produced when (2: 3) pattern was applied (Table, 4). These results held true in both seasons compared with the other patterns. The increases were 34.56 and 15.43% in the first season over those grown in 2: 1 and 2: 2 pattern, respectively; and 47.68 and 16.79% in the second season. These results may be due to increase in mungbean number of plants per unit area. In mixture compared with the other intercropping patterns.

Table (4): Effect of intercropping patterns on yield and yield components of maize and mungbean during 2003 and 2004 season

Crops	Maize						Mungbean			
Characters	Ear length (cm)	Ear diameter(cm)	Ear weight(g)	Shelling%	100- grain weight (g)	Grain yield / fed (ardab)	No of pods/plant	No of seeds/ plant	100-seed weight(g)	Seed yield / fed (kg)
Intercropping patterns	**2003 season**									
Maize : mungbean 2 : 1	21.11	46.31	264.72	78.17	41.24	17.47	43.42	354.08	4.67	414.41
2 : 2	21.05	45.83	265.67	78.03	41.01	17.43	32.01	309.23	4.43	483.10
2 : 3	21.25	44.42	264.25	78.74	41.34	17.32	29.49	269.68	4.20	557.62
L.S.D at 5%	N.S	0.67	N.S	N.S	N.S	N.S	0.43	8.14	0.05	9.14
	2004 season									
Maize : mungbean 2 : 1	21.45	42.41	249.78	78.94	43.20	18.10	33.97	360.70	4.96	342.27
2 : 2	21.23	42.34	243.53	78.44	42.02	17.89	31.61	312.76	4.41	412.65
2 : 3	20.94	42.87	235.81	78.33	40.76	17.77	29.73	274.91	3.90	481.57
L.S.D at 5%	N.S	N.S	1.90	N.S	0.36	0.15	0.40	5.46	0.06	6.44

4 - Interaction effects:

The effect of the interaction among maize varieties and N-levels was significant on ear length (2004 season), ear weight and 100-grain weight of maize in both seasons as well as 100-seeds weight and seed yield per feddan of mungbean in both seasons as shown in Table (5). The highest values of ear length, ear weight and 100-grain weight of maize as well as 100-seeds weight and seed yield of mungbean were produced from S .C.10 maize variety when intercropped mungbean plants with adding 140 kg N/feddan . There is no significant differences were detected between S .C .10 and T.W.C.321 maize varieties with adding 140 kg N/feddan for the above characters of maize and mungbean 0 Similar results were obtained by El-Douby and Allam (2001).

Table (6) indicated that the mean values of ear diameter (2003 season) and ear weight of maize in both seasons number of pods and seeds per plant (2003 season), 100-seeds weight (2003 season) and seed yield of mungbean (2004 season)were significantly affected by the interaction between maize varieties and intercropping patterns .S .C .10 maize variety when intercropped in 2: 1 pattern produced the highest ear weight of maize and 100-seeds weight of mungbean. Also S.C.10 maize variety under 2: 2 pattern gave the maximum ear diamter of maize. Whereas, the maximum number of pods and seeds /plant in the first season were obtained from T.W.C 321 maize variety under 2: 1 pattern . Intercropping mungbean with S.C.10 maize variety in 2: 3 pattern gave the greatest seed yield of mungbean/feddan in the second season .These results are in agreement with those obtained by El-Dansoury (2003)

Table (5): Effect of the interaction between maize varieties and N-Levels on some characters of maize and mungbean during 2003 and 2004 seasons.

Crops		Maize					Mungbean			
characters		Ear length (cm)	Ear weight (g)		100- grain weight(g)		100-seed weight(g)		Seed yield / fed (kgs	
Seasons		2004	2003	2004	2003	2004	2003	2004	2003	2004
Maize varieties	N-levels (kg/fed)									
S.C.10	100	20.75	255.25	264.08	40.55	41.97	4.01	4.18	413.40	410.39
	120	22.38	272.08	275.25	43.94	44.14	4.42	4.37	499.67	429.55
	140	24.78	308.25	292.67	47.65	48.03	4.86	4.77	550.94	458.77
T.W.C 321	100	19.78	256.00	249.50	39.98	40.33	4.01	4.31	424.40	358.82
	120	21.33	288.83	269.08	43.02	42.92	4.49	4.43	495.97	389.80
	140	24.39	309.67	286.50	47.34	47.81	4.83	4.61	549.72	442.31
Giza 2	100	18.58	181.92	161.42	33.94	35.26	4.08	4.33	440.73	367.81
	120	19.14	238.50	181.85	36.16	37.39	4.49	4.39	470.38	403.88
	140	19.72	273.42	207.25	38.23	40.13	4.71	4.42	520.19	448.16
L.S.D at 5%		1.04	13.33	7.77	1.05	0.92	0.10	0.12	22.65	13.99

Table (6): Effect of the interaction between maize varieties and intercropping patterns on some characters of maize and mungbean during 2003 and 2004 seasons.

Crops		Maize			Mungbean			
characters		Ear diameter (mm)	Ear weight (g)		No of pods/plant	No of seeds/plant	100-seed weight(g)	Seed yield / fed (kgs)
Seasons		2003	2003	2004	2003	2003	2003	2004
Maize varieties	Intercrop patterns							
S.C.10	2:1	49.14	272.08	284.25	33.04	339.38	4.71	354.47
	2:2	49.75	282.67	278.42	31.56	304.83	4.40	434.30
	2:3	48.28	280.83	269.33	29.38	271.40	4.19	509.93
T.W.C 321	2:1	49.18	289.67	271.50	36.88	389.40	4.62	334.45
	2:2	48.19	284.38	267.83	33.63	332.23	4.47	395.25
	2:3	46.04	280.00	265.75	30.40	278.90	4.25	461.23
Giza 2	2:1	40.61	232.42	193.58	33.33	333.46	4.69	337.90
	2:2	39.65	229.50	184.33	30.83	290.53	4.43	408.41
	2:3	38.95	231.92	172.33	28.69	258.76	4.15	473.54
L.S.D at 5%		1.16	7.13	3.30	0.74	14.11	0.09	11.16

There was a significant difference on ear weight of maize, number of pods and seeds per plant of mungbean in one season only as well as 100-seeds weight and seed yield of mungbean per feddan in bith seasons due to the interaction between N-level and intercropping patterns as shown in Table (7) mungben plants under 2: 1 pattern with increasing N-level up to 140 kg N/feddan gave the maximum mean values of number pods and seeds per plant and 100-seeds weight .Whereas when increasing plant density of mungbean in pattern (2: 3) with applied 140 kg N/feddan gave the greatest of ear weight of maize and maximum seed yield of mungbean per feddan .

Table (7): Effect of the interaction between N-Levels and intercropping patterns on some characters of maize and mung bean during 2003 and 2004 seasons.

Crops		Maize	Mungbean					
Characters		Ear weight (g	No of pods/plant	No of seeds/plant	100-seed weight(g)		Seed yield / fed (kgs	
Seasons		2003	2003	2003	2003	2004	2003	2004
Maize varieties	Intercrop patterns							
100	2:1	234.25	32.30	289.32	4.29	4.73	368.71	315.89
	2:2	234.50	28.12	243.81	4.12	4.33	427.52	379.05
	2:3	224.42	25.97	216.44	3.69	3.77	482.30	442.07
120	2:1	265.33	34.58	362.59	4.65	4.89	424.60	344.41
	2:2	265.08	32.06	317.68	4.45	4.42	480.95	407.65
	2:3	269.00	28.28	274.40	4.29	3.87	560.48	471.17
140	2:1	294.58	38.43	430.19	5.07	5.26	449.92	366.52
	2:2	297.42	35.84	376.81	4.73	4.49	540.85	451.27
	2:3	299.33	43.23	383.90	4.61	4.06	630.08	531.45
L.S.D at 5%		7.12	0.74	0.45	0.09	0.11	15.83	11.16

The effect of the interaction between the three factors under study was significant on ear weight (in the first season), grain yield of maize per feddan (in the second season), number of pods and seeds per plant and seed yield of mungbean per feddan in both seasons as shown in Table (8) .S.C.10 maize variety with added 140 kg N/feddan when intercropped with mungbean under 2:3 pattern gave the greatest grain yield of maize and seed yield of mungbean per feddan followed by T.W.C 321 maize variety .whereas, the maximum mean values of number of pods/plant in both seasons was produced from T.W.C 321 maize variety with applied 140kgN/fed when intercropped with mungbean under 2:1 pattern. Similar results were obtained by El Dansoury (2003) and Lamlom (2006).

Table (8): Effect of the interaction between three factors on some characters of maize and mungbean during 2003 and 2004 seasons.

Crops			Maize		Mungbean				
Characters			Ear weight (g)	Grain yield /fed (ardab))	No of pods/plant		No of seeds/plant	Seed yield / fed (kgs)	
Seasons			2003	2004	2003	2004	2004	2003	2004
Maize varieties	N-levels (kg/fed	Intercrop patterns							
S.C 10	100	2 :1	244.75	17.59	28.25	28.10	263.08	370.23	341.06
		2 :2	263.50	17.72	26.73	26.43	227.38	420.75	412.44
		2 :3	257.50	17.53	25.70	25.60	213.64	449.22	477.65
	120	2 :1	266.25	18.97	32.55	34.55	365.44	423.37	363.53
		2 :2	273.25	18.67	31.40	30.95	300.76	483.34	437.11
		2 :3	276.75	18.47	27.47	28.40	255.60	592.31	488.01
	140	2 :1	305.25	20.80	38.33	36.25	433.07	441.89	358.84
		2 :2	311.25	20.57	36.55	34.90	371.81	549.75	453.34
		2 :3	308.25	20.91	34.95	33.20	330.19	661.18	564.13
TWC 321	100	2 :1	268.75	17.87	35.25	34.57	328.18	369.68	300.36
		2 :2	261.50	17.63	32.10	30.95	267.36	432.30	354.36
		2 :3	237.75	17.48	28.05	28.85	230.94	471.23	421.75
	120	2 :1	288.25	18.65	37.25	35.20	371.14	437.42	332.10
		2 :2	287.50	18.35	33.40	33.55	329.15	490.01	381.66
		2 :3	290.75	18.13	28.90	32.27	300.72	560.50	455.64
	140	2 :1	312.00	20.59	28.15	38.15	454.01	459.66	370.90
		2 :2	305.50	20.02	35.40	37.10	415.60	550.84	449.74
		2 :3	311.50	19.68	34.25	35.60	375.00	638.66	506.29
Giza 2	100	2 :1	189.25	14.77	27.20	28.25	276.71	366.21	306.25
		2 :2	178.50	15.25	25.53	25.30	236.70	429.51	370.35
		2 :3	178.00	14.85	24.15	23.40	204.74	526.46	426.82
	120	2 :1	241.50	15.59	33.95	34.10	351.19	413.01	337.61
		2 :2	234.50	15.65	31.37	32.15	323.09	469.49	404.17
		2 :3	239.50	15.94	28.45	29.03	266.87	528.63	469.87
	140	2 :1	266.50	17.68	38.15	36.55	403.50	448.22	369.82
		2 :2	275.50	17.15	35.57	33.15	343.03	521.95	450.73
		2 :3	278.25	16.97	33.48	31.20	296.52	590.40	523.94
L.S.D at 5%			12.36	0.45	1.29	1.19	16.36	27.41	19.33

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تأثير تحميل فول المانج مع الذرة الشامية علي المحصول ومكوناته

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أقيمت تجربتان حقليتان في محطة بحوث سرس اللبان بمحافظة المنوفية مركز البحوث الزراعية خلال موسمى ٢٠٠٣/٢٠٠٤ وذلك لتقييم ثلاث أصناف ذرة شامية وثلاث معدلات من التسميد النيتروجيني وثلاث نظم من التحميل للذرة الشامية مع فول المانج بالإضافة إلي أربع معاملات زراعية منفردة وهي٣ زراعات منفردة لأصناف الذرة الشامية وزراعة منفردة لفول المانج على المحصول ومكوناته لكل من الذرة الشامية وفول المانج. وأستخدم تصميم القطع المنشقة مرتين في أربع مكررات .ويمكن تلخيص أهم النتائج المتحصل عليها الأتية:

أعطي الصنف هجين ثلاثى ٣٢١ أعلي القيم في طول الكوز ووزن الكوز بينما تفوق الصنف هجين فردي ١٠ معنوياً علي أصناف الذرة الأخرى في قطر الكوز والنسبة المئوية للتفريط ووزن ١٠٠ حبة ومحصول الحبوب للفدان وزن الكوز. أدى إضافة ١٤٠ كجم ن/للفدان إلي زيادة معنوية علي صفات الكوز ووزن ١٠٠ حبة ومحصول الحبوب للفدان .

تفوق نظام التحميل (٢: ١) معنوياً علي الأنظمة الأخرى في محصول الذرة الشامية ومكوناتة فى كلا الموسمين. تفوق الصنف هجين فردى ١٠ مع إضافة ١٤٠كجم ن/فدان تحت نظام التحميل ٢: ٣ فى محصول حبوب الفدان

أدي تحميل نباتات فول المانج مع صنف الذرة هجين ثلاثى ٣٢١ للحصول علي أعلي عدد القرون وبذور النبات. بينما تفوق تحميل نباتات فول المانج مع صنف الذرة هجين فردي ١٠ علي بقية أصناف الذرة الأخرى في محصول بذور فول المانج/للفدان .

زاد معنويا محصول فول المانج ومكوناته نتيجة زيادة مستويات التسميد النيتروجيني من ١٢٠ إلي ١٤٠ كجم ن/للفدان في كلا الموسمين . زاد محصول بذور الفدان نتيجة الزيادة في مستويات التسميد النيتروجيني من الزيادة ١٠٠ إلي ١٢٠ و١٤٠ كجم ن/ للفدان بنسبة ١٤,٦٧ ، ٢٦,٧٨% علي التوالى في الموسم الأول . و ٧,٥٨ ، ١٨,٦٧% في الموسم الثاني بالمقارنة بمستوي التسميد ١٠٠ كجم ن/للفدان.

تفوق معنويا نظام التحميل (٢:١) علي النظم الأخرى في عدد قرون وبذور النبات وزن ١٠٠ بذرة في الموسمين . وأعطي نظام التحميل (٢: ٣) أعلي محصول لبذور الفدان. وكانت الزيادة ٣٤,٥٦ ، ١٥,٤٣% في الموسم الأول عن نظام التحميل ٢: ١ ، ٢:٢ علي التوالي و ٤٧,٦٨ ، ١٦,٧٩% فى الموسم الثانى.

تأثر محصول فول المانج بالتفاعل بين العوامل المختلفة تحت الدراسة وكانت أفضل النتائج لمحصول بذور فول المانج المحمل مع صنفى الذرة الشامية هجين فردى ١٠، هجين ثلاثى ٣٢١ مع إضافة ١٤٠كجم ن/فدان تحت نظام التحميل ٢: ٣.