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Effect of nitrogen fertilizer rates and splitting nitrogen on yield and yield components of Egyptian cotton cultivar Giza 90 under surface and drip irrigation systems in newly reclaimed lands

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Abstract

The current study aimed to use surface and drip irrigation systems with rates of nitrogen fertilizer and splitting of nitrogen fertilizer rates. Two field experiments were carried out at the Agricultural Research Farm at Al-Kawamel site, Faculty of Agriculture, Sohag University, Sohag Governorate, Egypt during 2019 and 2020 seasons to study effect of two irrigation systems; surface and drip irrigation, three rates of nitrogen (N) fertilizer and three splitting of N rates on yield and its components of cultivar Giza 90 cotton. In each season, separate trial was conducted for each irrigation system and the combinations between N fertilization rates and splitting N fertilizer rates. A field experiment was designed as randomized complete block with split-plot arrangement of treatment with three replications, whereas rates of nitrogen fertilizer were allocated to the main plots and the sub-main plots include splitting of nitrogen fertilizer. Results indicated that sowing Egyptian cotton crop (Giza 90) cultivar in newly reclaimed sandy soil with drip irrigation system, fertilization at a rate of 90 kg or 75 kg nitrogen per feddan with splitting to 4 doses, caused to maximized productivity through increased significantly the seed cotton yield 6.50 and 6.33 kentar/feddan, respectively. Drip irrigation system saved the amount of water required per feddan to almost a quarter (25%) compared to the surface irrigation, under conditions of the area under the study.

Keywords:
Egyptian cotton, Irrigation, Nitrogen fertilizer rates, Nitrogen fertilizer splitting.

INTRODUCTION

Egyptian cotton (*Gossypium barbadense* L.) is considered the most important crop and fibers in Egypt and the world. In the recent past, the Egyptian long staple cotton was the most important cash crop and played a significant role in the economic development of the country. It is one of the main supplies of long and extra-long staple cotton which is more suitable to the manufacture of high quality fabrics. Cotton provides raw material not only for the textile industry but also the feed and oil industries with its seed, rich in both oil (18-24%) and protein (20-40%) by Cetin and Bilgel (2002). The cultivated area of cotton was 100000 hectare (238,095 feddan) in 2019; seed cotton yield was with an average 3050 kg/hectare (1281 kg/feddan) with an average 8.13 kentar/feddan, according to FAO statistics (2019). One of the critical problems in cotton production is the amount of irrigation water. Despite this progressive water shortage, most farmers, especially small ones continue to use flood irrigation that results in high water loss by evaporation and drainage. Research shows that over 45 % of water applied is lost to deep soil drainage and surface runoff (Karrou *et al*. 2012). Many efforts have been made by specialized to conserve and prevent wasteful in irrigation water by using drip irrigation. Nitrogen is a major limiting nutrient for crop production. Cotton requires proper nitrogen (N) fertilization to achieve maximum yields. N nutrient supply strongly affects leaf area and the rate of photosynthesis and, thus, the ability of the plant to direct photosynthates to sink sites. Hou *et al.* (2021) found that increasing nitrogen rate had positive effects on seed cotton yield. The optimal seed cotton yield was obtained under N350 ha^{-1} in both seasons (6655.58 kg ha^{-1}) and (6309.3 kg ha^{-1}), respectively. Yadav *et al.* (2014) found that the application of 150 kg N/ha gave significantly highest seed cotton yield. This treatment gave 49.8% higher seed cotton yield. It gave the maximum number of bolls/plant, boll weight and seed index. Zonta *et al*. (2016) found that the highest productivity was observed at the 140 kg N /ha, compared with 70 kg N /ha. Farweez *et al*. (2020) indicated that splitting nitrogen fertilizer into three doses gave the highest mean values for mention traits in both seasons. Sattar *et al*. (2017) found that the highest significant of seed cotton yield (1559 kg ha^{-1} and 1135.7 kg ha^{-1}) were observed with ten split applications of N with each irrigation.

The current study aims to evaluate the surface and drip irrigation systems, rates of nitrogen fertilizer and splitting of nitrogen fertilizer rates on yield and yield components of Egyptian cotton (cv. Giza 90) and to identify the best combination of production treatments to improve yield.

MATERIALS AND METHODS

Two field experiments were performed at Agricultural Research Farm at new Sohag city, Faculty of Agriculture, Sohag University, during the two seasons of 2019 and 2020 to study response of two irrigation systems (surface and drip irrigation), three nitrogen rates and three splitting of nitrogen fertilizer on yield and yield components for the cultivar Giza 90. The experiment included 18 treatments, which were the combinations of two irrigation systems, three rates of nitrogen fertilizer and three of nitrogen fertilizer splitting.

Experiment 1: Surface irrigation.

Experiment 2: Drip irrigation.

Each of these experiments includes the following treatments:

A. Rates of nitrogen fertilizer:

1- 60 Kg N/feddan (**N_1**).

2- 75 Kg N/feddan (**N_2**).

3- 90 Kg N/feddan (**N_3**).

B. Splitting of nitrogen fertilizer rates to:

1- **2 doses (S_1):** Splitting to 2 equal parts, doses were added after the 20 and 40 days from sowing.

2- **4 doses (S_2):** Splitting to 4 equal parts, doses were added after the 20, 40, 60 and 80 days from sowing.

3- **6 doses (S_3):** Splitting to 6 equal parts, doses were added after the 20, 40, 60, 80, 100 and 120 days from sowing.

Randomized Complete Block design in a split-plot arrangement with three replicates was used. Rates of nitrogen fertilizer were arranged randomly in the main plots, whereas splitting of nitrogen fertilizer was allocated randomly in the sub-plots. The experimental sub-plot area was 10.56 m^2 (4.4 m length and 2.4 m width), consisting of 4 ridges with 60 cm inter-row spacing with a distance of 20 cm between hills with two plants in hill.

The nitrogen fertilizer was added in the form of ammonium nitrate (33.5% N) at:

1. Surface irrigation: Splitting of the nitrogen fertilizer rates were added in the solid form on bottom the plants.

2. Drip irrigation: Splitting of the nitrogen fertilizer rates were applied through the drip irrigation system, nitrogen fertilizer was added in form a solution bottom the plants.

The phosphorus fertilizer in the form of calcium super phosphate (12.5% P_2O_5) at a rate of 200 kg/feddan was added during preparation of soil to sowing. The potassium fertilizer in the form of potassium sulfate (47% K_2O) at a rate of 50 kg/feddan was added before flowering stage. Other agricultural practices of Egyptian cotton were performed as recommended for Egyptian cotton production in the district by the Egyptian Ministry of Agriculture.

Soil of the experiments was Sandy clay loam, Mechanical and chemical properties of the soils are shown in Table (1).

Table (1) Mechanical and chemical properties of top-soil (0-30 cm) of the experimental site in 2019 and 2020 seasons.

Soil properties	2019	2020
Sand (%)	62	62
Silt (%)	14	16
Clay (%)	24	22
Soil texture	Sandy clay loam	
Organic matter (%)	0.61	0.69
Total N (%)	0.14	0.28
P_2O_5 (ppm)	6.32	6.85
K_2O (ppm)	120	168
pH (1:2.5)	7.85	7.91

Table (2) The amount of water consumed (m^3/feddan) for each irrigation system from 15th and 17th of March to 25th of September in both seasons 2019 and 2020, respectively.

Irrigation systems	The amount of water consumed (m^3/feddan)	
	Season 2019	season 2020
Surface irrigation	8187.20	8075.20
Drip irrigation	2252.17	2069.57
% Drip to surface	27.51%	25.69%

Yield and its components traits:

During two seasons determine the following traits:

1. Number of opened bolls/plant.
2. Average boll weight in grams: was estimated as follow:

$$\frac{\text{Seed cotton yield/plant in grams}}{\text{Number of harvested open bolls/plant}}$$

3. Seed index (Weight of 100 seeds (g).
4. Seed cotton yield in kentar/feddan: seed cotton yield/m^2 in kilograms was recorded and transformed to kentar/feddan (one kentar =157.5 kg).

Statistical analysis:-The collected data were statistically analyzed each season separately using Proc. GLM procedure (SAS version 9.1, SAS Institute 2003). Least significant difference (LSD) test at 5% level of probability was used for comparing among means of the two studied factors and their interaction.

*Feddan = 4200m^2

RESULTS AND DISCUSSION

The combined analysis

Mean squares of the combined analysis of the two seasons in Table 3 showed that the differences between years (Y) were highly significant for all traits. Irrigation systems (I) were highly significant for all traits. Nitrogen fertilizer levels (N) were highly significant for all traits under study. Splitting of N (S) was highly significant for all the studied traits. The interaction between (Y x I) was highly significant for seed cotton yield in kentar/fed. and average boll weight in g, while the other traits were insignificant. The

interaction between (Y x N) were highly significant for average boll weight in g, while the other traits were insignificant. The interaction between (I x N) were highly significant for seed cotton yield in kentar/fed. and seed index while the other traits were insignificant. The interaction between (Y x S) was highly significant for seed cotton yield in kentar/fed. and average boll weight in g, while the other traits were insignificant. The interaction between (I x S) were highly significant for seed cotton yield in kentar/fed., and average boll weight in g, while seed index was significant but the number of opened bolls/plant was insignificant. The interaction between (N x S) were highly significant for seed cotton yield in kentar/fed., and average boll weight in g, while the other traits were insignificant. The interaction between (Y x I x N) was insignificant for all the studied traits. The interaction between (Y x I x S) were highly significant for seed cotton yield in kentar/fed., and average boll weight in g and the other traits were insignificant. The interaction between (Y x N x S) and the interaction between (I x N x S) were highly significant for average boll weight in g and the other traits were insignificant. The interaction between (Y x I x N x S) were insignificant for all the studied traits.

Table 3. Mean squares of the combined analysis for number of opened bolls/plant, average boll weight in g, seed index and seed cotton yield in kentar/fed. traits over the two seasons.

S.O.V	D.F.	Mean squares			
		Number of opened bolls	Average boll eight g	Seed index	Seed cotton kentar/fed.
Years (Y)	1	20.84**	4.29**	0.02**	48.1420**
Irrigation system (I)	1	21.14**	0.32**	0.11**	5.15**
Y x I	1	0.01	0.01**	0.00001	0.08**
Error a	8	1.93	0.001	0.001	0.01
Nitrogen rate (N)	2	41.32**	0.71**	0.17**	6.22**
Y x N	2	0.24	0.01**	0.0004	0.01
I x N	2	0.01	0.0003	0.01**	0.26**
Y x I x N	2	0.02	0.001	0.000001	0.00
Error b	16	0.86	0.001	0.002	0.01
Splitting of N (S)	2	223.46**	3.49**	1.10**	31.38**
Y x S	2	0.29	0.06**	0.002	0.41**
I x S	2	0.22	0.01**	0.005*	0.16**
N x S	4	0.59	0.03**	0.002	0.34**
Y x I x S	2	0.02	0.03**	0.0004	0.11**
Y x N x S	4	0.03	0.01**	0.0003	0.01
I x N x S	4	0.31	0.01**	0.002	0.02
Y x I x N x S	4	0.04	0.001	0.0002	0.01
Pooled error	48	0.77	0.001	0.001	0.01219
*, **; Significant at 5 and 1% levels of probability, respectively.					

Mean performance

1. Number of opened bolls/plant

Data reported in Table 4 indicated that the number of opened bolls/plant of the two seasons response to irrigation systems, N rates, splitting nitrogen fertilizer and their interactions. The results in Table 4 indicated that the average number of opened bolls/plant under surface and drip irrigation was 9.87 and 10.75, respectively over the two seasons. The data in the same Table revealed that the average number of opened bolls/plant under surface irrigation and N1, N2 and N3 was 8.65, 10.34 and 10.60 over two seasons, respectively. Under drip irrigation and N1, N2 and N3, it was 9.50, 11.27 and 11.48 over the two seasons, respectively. The data in Table 4 showed that the average number of opened bolls/plant under surface irrigation, N fertilizer rates and S1, S2 and S3 of splitting was 7.19, 12.01 and 10.40 over the two seasons, respectively. While, the average number of opened bolls/plant under drip irrigation N fertilizer rates and S1, S2 and S3 of splitting was 7.94, 12.86 and 11.45 over the two seasons, respectively. These results are agreement with those obtained by Said *et al*. (2011), Abd El-Aal (2014) and Amal (2014).

Table 4. Effect of irrigation systems, N rates, splitting N fertilizer and their interactions on number of opened bolls/plant at harvest in 2019 and 2020 seasons (combined analysis).

Irrigations	Season	2019				2020				Combined			
		S1	S2	S3	Mean	S1	S2	S3	Mean	S1	S2	S3	Mean
Surface	N1	6.03	10.11	8.84	**8.33**	6.58	10.75	9.59	**8.97**	6.31	10.43	9.22	**8.65**
	N2	7.09	11.91	10.49	**9.83**	7.89	13.39	11.28	**10.85**	7.49	12.65	10.89	**10.34**
	N3	7.40	12.39	10.66	**10.15**	8.16	13.48	11.49	**11.04**	7.78	12.94	11.08	**10.60**
Mean		**6.84**	**11.47**	**10.00**	**9.44**	**7.54**	**12.54**	**10.79**	**10.29**	**7.19**	**12.01**	**10.40**	**9.87**
$LSD_{0.05}$ N		1.24				1.12				0.88			
S		0.83				0.99				0.56			
N x S		N.S				N.S				N.S			
Drip	N1	6.65	11.21	9.53	**9.13**	7.25	12.08	10.28	**9.87**	6.95	11.65	9.91	**9.50**
	N2	7.95	12.80	11.62	**10.79**	8.70	13.90	12.65	**11.75**	8.33	13.35	12.14	**11.27**
	N3	8.15	12.98	11.77	**10.967**	8.92	14.19	12.83	**11.98**	8.54	13.59	12.30	**11.48**
Mean		**7.58**	**12.33**	**10.97**	**10.30**	**8.29**	**13.39**	**11.92**	**11.20**	**7.94**	**12.86**	**11.45**	**10.75**
$LSD_{0.05}$ N		1.52				1.16				0.72			
S		0.84				0.92				0.64			
N x S		N.S				N.S				N.S			

N: rates (3) of nitrogen fertilizer.
S: splitting (3) of nitrogen fertilizer.
N x S: interaction between nitrogen and splitting of nitrogen.

Table 5. Effect of irrigation systems, N rates, splitting N fertilizer and their interactions on average boll weight in g at harvest in 2019 and 2020 seasons (combined analysis).

Irrigations	Season	2019				2020				Combined			
		S1	S2	S3	Mean	S1	S2	S3	Mean	S1	S2	S3	Mean
Surface	N1	0.72	1.19	1.01	**0.97**	1.15	1.61	1.48	**1.41**	0.94	1.40	1.25	**1.20**
	N2	0.84	1.57	1.25	**1.22**	1.31	1.87	1.68	**1.62**	1.08	1.72	1.47	**1.42**
	N3	0.83	1.61	1.28	**1.24**	1.33	1.90	1.69	**1.64**	1.08	1.76	1.49	**1.44**
Mean		**0.80**	**1.46**	**1.18**	**1.15**	**1.26**	**1.79**	**1.62**	**1.56**	**1.03**	**1.63**	**1.40**	**1.35**
$LSD_{0.05}$ N		0.03				0.02				0.02			
S		0.02				0.03				0.02			
N x S		0.03				0.05				0.02			
Drip	N1	0.78	1.39	1.07	**1.08**	1.25	1.74	1.55	**1.51**	1.02	1.57	1.31	**1.30**
	N2	0.90	1.69	1.47	**1.35**	1.39	1.95	1.81	**1.72**	1.15	1.82	1.64	**1.54**
	N3	0.92	1.71	1.49	**1.37**	1.40	1.97	1.82	**1.73**	1.16	1.84	1.66	**1.55**
Mean		**0.87**	**1.60**	**1.34**	**1.27**	**1.35**	**1.89**	**1.73**	**1.65**	**1.11**	**1.74**	**1.54**	**1.46**
$LSD_{0.05}$ N		0.02				0.04				0.02			
S		0.02				0.02				0.02			
N x S		0.04				0.03				0.03			

N: rates (3) of nitrogen fertilizer.
S: splitting (3) of nitrogen fertilizer.
N x S: interaction between nitrogen and splitting of nitrogen.

Table 6. Effect of irrigation systems, N rates, splitting N fertilizer and their interactions on seed index at harvest in 2019 and 2020 seasons (combined analysis).

Irrigations	Season	2019				2020				Combined			
		S1	S2	S3	Mean	S1	S2	S3	Mean	S1	S2	S3	Mean
Surface	N1	6.97	7.31	7.18	**7.15**	7.04	7.32	7.21	**7.19**	7.01	7.32	7.20	**7.18**
	N2	7.05	7.43	7.25	**7.24**	7.09	7.44	7.28	**7.27**	7.07	7.44	7.27	**7.26**
	N3	7.07	7.45	7.27	**7.26**	7.11	7.46	7.30	**7.29**	7.09	7.46	7.29	**7.28**
Mean		**7.03**	**7.40**	**7.23**	**7.22**	**7.08**	**7.41**	**7.26**	**7.25**	**7.06**	**7.41**	**7.25**	**7.24**
$LSD_{0.05}$ N		0.05				0.03				0.02			
S		0.03				0.04				0.02			
N x S		N.S				N.S				N.S			
Drip	N1	7.00	7.35	7.21	**7.19**	7.06	7.370	7.25	**7.23**	7.03	7.36	7.23	**7.21**
	N2	7.11	7.48	7.38	**7.32**	7.16	7.50	7.38	**7.35**	7.14	7.49	7.38	**7.33**
	N3	7.14	7.49	7.40	**7.34**	7.17	7.52	7.41	**7.37**	7.16	7.51	7.41	**7.36**
Mean		**7.08**	**7.44**	**7.33**	**7.28**	**7.13**	**7.46**	**7.35**	**7.31**	**7.11**	**7.45**	**7.34**	**7.30**
$LSD_{0.05}$ N		0.04				0.04				0.02			
S		0.04				0.04				0.03			
N x S		N.S				N.S				N.S			

N: rates (3) of nitrogen fertilizer.
S: splitting (3) of nitrogen fertilizer.
N x S: interaction between nitrogen and splitting of nitrogen.

Table 7. Effect of irrigation systems, N rates, splitting N fertilizer and their interactions on seed cotton yield in kentar (157.5 kg)/fed. at harvest in 2019 and 2020 seasons (combined analysis).

Irrigations	Season	2019				2020				Combined			
		S1	S2	S3	Mean	S1	S2	S3	Mean	S1	S2	S3	Mean
Surface	N1	3.02	4.09	3.78	**3.63**	4.18	5.88	5.02	**5.03**	3.60	4.99	4.40	**4.33**
	N2	3.23	4.98	4.20	**4.14**	4.47	6.63	5.45	**5.52**	3.85	5.91	4.83	**4.86**
	N3	3.35	5.05	4.39	**4.26**	4.55	6.76	5.64	**5.65**	3.95	5.91	5.02	**4.96**
Mean		**3.20**	**4.71**	**4.12**	**4.01**	**4.40**	**6.42**	**5.37**	**5.40**	**3.80**	**5.60**	**4.75**	**4.72**
$LSD_{0.05}$ N		0.08				0.12				0.06			
S		0.09				0.14				0.06			
N x S		0.14				0.26				0.09			
Drip	N1	3.22	4.59	4.07	**3.96**	4.27	6.03	5.24	**5.18**	3.75	5.31	4.66	**4.57**
	N2	3.68	5.63	4.81	**4.71**	4.75	7.02	6.28	**6.02**	4.22	6.33	5.55	**5.37**
	N3	3.76	5.80	4.94	**4.83**	4.85	7.20	6.41	**6.15**	4.31	6.50	5.68	**5.50**
Mean		**3.55**	**5.34**	**4.61**	**4.50**	**4.62**	**6.75**	**5.98**	**5.78**	**4.09**	**6.05**	**5.30**	**5.15**
$LSD_{0.05}$ N		0.10				0.10				0.07			
S		0.09				0.13				0.09			
N x S		0.15				0.22				0.15			

N: rates (3) of nitrogen fertilizer.
S: splitting (3) of nitrogen fertilizer.
N x S: interaction between nitrogen and splitting of nitrogen.

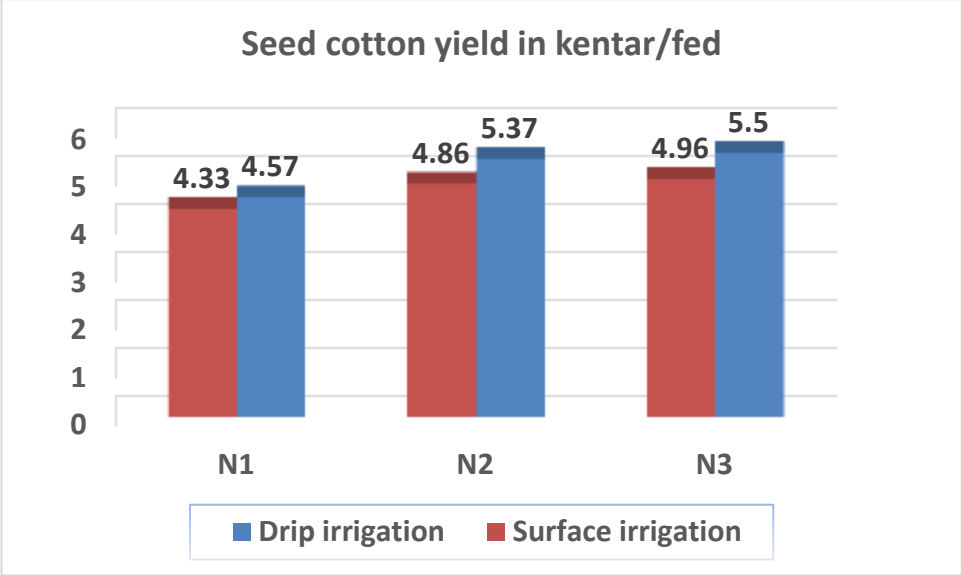

Fig. 1. Interaction effect of irrigation systems and N fertilization on seed cotton yield in kentar/fed. in both seasons.

N1, N2 and N3 = Rates of nitrogen fertilizer at 60, 75 and 90 Kg N/feddan, respectively.

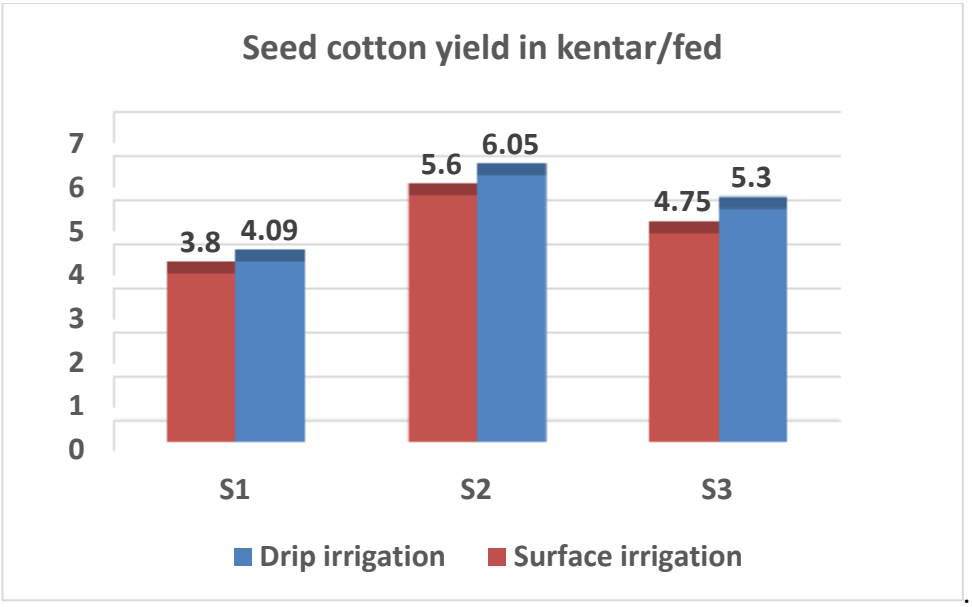

Fig. 2. Interaction effect of irrigation systems, N fertilization and levels of splitting on seed cotton yield in kentar/fed. in both seasons.

S1, S2 and S3 = Splitting of nitrogen fertilizer rates at 2, 4 and 6 doses of rates of nitrogen fertilizer, respectively.

2. Average boll weight in g

Data recorded in Table 5 showed that the average boll weight in g of the two seasons response to irrigation systems, N rates, splitting nitrogen fertilizer and their interactions. The results in the same Table revealed that average boll weight in g under surface and drip irrigation was 1.35 and 1.46, respectively over the two seasons. The data presented in Table 5 concluded that the average boll weight in g under surface irrigation and N1, N2 and N3 was 1.20, 1.42 and 1.44 over the two seasons, respectively. But, under drip irrigation and N1, N2 and N3 was 1.30, 1.54 and 1.55 over the two seasons, respectively. The results in Table 5 recorded that the average boll weight in g under surface irrigation, N fertilizer rates and S1, S2 and S3 of splitting was 1.03, 1.63 and 1.40 over the two seasons, respectively. But, the average boll weight in g under drip irrigation, N fertilizer rates and S1, S2 and S3 of splitting was 1.11, 1.74 and 1.54 over the two seasons, respectively. These results are in harmony with Molin and Hugie (2010), Elhamamsey *et al*. (2016) and Sohair *et al.* (2018).

3. Seed index

Results in Table 6 showed that the seed index of the two season's response to irrigation systems, nitrogen rates, splitting nitrogen fertilizer and their interactions. The data in Table 6 revealed that the average seed index under surface and drip irrigation was 7.24 and 7.30, respectively over the two seasons. The data in Table 6 reported that the average seed index under surface irrigation and N1, N2 and N3 was 7.18, 7.26 and 7.28 over the two seasons, respectively. While, under drip irrigation and N1, N2 and N3 was 7.21, 7.33 and 7.36 g over the two seasons, respectively. The data recorded in Table 6 showed that the average seed index under surface irrigation, N fertilizer rates and S1, S2 and S3 of splitting was 7.06, 7.41 and 7.25 over the two seasons, respectively. On the other hand, the average seed index under drip irrigation, N rates and S1, S2 and S3 of splitting was 7.11, 7.45 and 7.34 over the two seasons, respectively. Such findings are in harmony with those obtained by Ibrahim *et al.* (2010) and Kassab *et al*. (2019).

4. Seed cotton yield in kentar (157.5 kg)/fed.

Data in Table 7 showed that the seed cotton yield in kentar/fed. of the two seasons response to irrigation systems, nitrogen rates, splitting nitrogen fertilizer and their interactions. The results in Table 7 showed that the average seed cotton yield in kentar/fed. under surface and drip irrigation was 4.72 and 5.15, respectively over the two seasons. The data in Table 7 and Fig. 1 indicated that the average seed cotton yield in kentar/fed. under surface irrigation and N1, N2 and N3 was 4.33, 4.86 and 4.96 over the two seasons, respectively. While, under drip irrigation and N1, N2 and N3 the average seed cotton yield in kentar/fed. was 4.57, 5.37 and 5.50 over the two seasons, respectively. The data in Table 7 and Fig. 2 showed that the average seed cotton yield in kentar/fed. under surface irrigation, N fertilizer rates and S1, S2 and S3 of splitting was 3.80, 5.60 and 4.75 over the two seasons, respectively. But, under drip irrigation N fertilizer rates and S1, S2 and S3 of splitting, the average seed cotton yield in kentar/fed. was 4.09, 6.05 and 5.30 over two seasons, respectively. Such findings are in general agreement with this obtained by El-Sayed (2011), Khalifa *et al.* (2011) and Abd El-Aal (2014).

CONCLUSION

By reviewing the results of this study, it could be highly recommended for sowing Egyptian cotton crop (Giza 90) cultivar in newly reclaimed sandy soil with drip irrigation system, fertilization at a rate of 90 kg or 75 kg nitrogen per feddan with splitting to 4 doses, caused to maximized productivity through increased the seed cotton yield in kentar/feddan and obtainment the highest economic income, with saved the amount of water required per feddan to almost a quarter (25%) compared to the surface irrigation, under conditions of the area under the study.

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تأثير معدلات السماد النيتروجيني وتجزئته على المحصول و مكوناته لصنف القطن المصري جيزة 90 تحت نظامي الري السطحي والري بالتنقيط في الأراضي المستصلحة حديثًا

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الملخص:

تهدف الدراسة الحالية إلى استخدام أنظمة الري السطحي والري بالتنقيط مع معدلات السماد النيتروجيني وتجزئة معدلات السماد النيتروجيني. أجريت تجربتان ميدانيتان بمزرعة البحوث الزراعية بمدينة سوهاج الجديدة ، كلية الزراعة، جامعة سوهاج، محافظة سوهاج، مصر خلال موسمي 2019 و 2020 لدراسة تأثير نظامي الري السطحي والري بالتنقيط، وثلاثة معدلات سماد نيتروجيني (N) وثلاثة معدلات تجزئة للسماد النيتروجيني على المحصول ومكوناته من صنف القطن المصري جيزة 90. في كل موسم. أجريت تجربة منفصلة لكل نظام ري والتوليفات بين معدلات التسميد النيتروجيني ومعدلات تجزئة السماد النيتروجيني. حيث كان التصميم المستخدم في التجربة هو تصميم القطاعات كاملة العشوائية في ثلاث مكررات ورتبت معدلات السماد النيتروجيني في القطع الرئيسية بينما معدلات التجزئة للسسماد النيتروجيني في القطع المنشقة. أشارت النتائج إلى أن زراعة صنف القطن المصري (جيزة 90) في تربة رملية مستصلحة حديثاً بنظام الري بالتنقيط وتسميد بمعدل 90 كجم أو 75 كجم نيتروجين للفدان مع التقسيم إلى 4 جرعات ، أدى إلى زيادة معنوية في الإنتاجية من خلال زيادة محصول القطن الزهر 6.50 و 6.33 قنطار/فدان على التوالي. كما وفر نظام الري بالتنقيط كمية المياه المطلوبة لري لفدان إلى ما يقارب الربع (25%) مقارنة بالري السطحي تحت ظروف المنطقة قيد الدراسة.