J. Plant Production, Mansoura Univ., Vol. 9 (8): 689 - 693, 2018

Effect of Nitrogen and Phosphorus Fertilizers Levels on Yields and Technological Characters of Three Flax Cultivars under Saline Soil Conditions

Leilah, A. A.[1] ; M. H. Ghonema[1] ; M. E. Kineber[2] and I. H. M. Talha[2]

[1] Agronomy Department, Faculty of Agriculture, Mansoura University, Egypt.

[2] Fiber Crops Research Department, Field Crops Research Institute, Agricultural Research Center, Giza, Egypt.

ABSTRACT

The experiment was carried out at the Farm Experimental of Sakha Agricultural Research Station (El-Hamrawy), Agricultural Research Center (ARC), Egypt through 2015/2016 and 2016/2017 seasons to investigate response of three flax cultivars to nitrogen and phosphorus fertilizers levels on yields and its components as well as technological characters under saline soil conditions. The experiment was done in a split-plot design with three replications. Where, the main-plots were allocated to three flax cultivars *i.e.* Sakha 3 (fiber flax cultivar), Giza 11 (dual purpose flax cultivar) and Sakha 5 (oil flax cultivar). The sub-plots were allocated to four combination treatments of nitrogen and phosphorus fertilizers *i.e.* 45 kg N + 15.5 kg P_2O_5/fed, 45 kg N + 22.5 kg P_2O_5/fed, 55 kg N + 15.5 kg P_2O_5/fed and 55 kg N + 22.5 kg P_2O_5/fed. The results were obtained could be summarized as follows:* Sakha 3 gave the best results other to flax cultivars under studied and produced the maximum valuesof length of technical , fiber yield per plant and per feddan, fiber length, total fiber % and fiber fineness in both seasons. Meanwhile, Giza 11 cultivar significantly superior other studied cultivars and resulted in the maximum values of diameter of stem , straw yield per plant and per feddan, length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. of seeds/plant, seed yield per plant and per feddan in both seasons. However, Sakha 5 cultivar produced the maximum values of seed oil content. *Maximum numbers of all characters studied were showed from fertilizing flax plants with 55 kg N + 22.5 kg P_2O_5/fed, except fiber fineness in both seasons. It can be mentioned that mineral fertilizing Giza 11 cultivar with 55 kg N + 22.5 kg P_2O_5/fed in order to maximizing seed yield and its components and mineral fertilizing Sakha 3 cultivar with 55 kg N + 22.5 kg P_2O_5/fed to maximizing straw and fiber yields under saline soil conditions in Kafrelshiekh governorate, Egypt.

Keywords: Flax, cultivars, nitrogen levels, phosphorus levels, Salinity conditions, yields, technological characters.

INTRODUCTION

Flax (*Linum usitatissimum* L.) production dates back to ancient history. Europe produces most of the high-quality long-fiber flax used for linens, rugs, and other textiles. Seeds from flax are crushed to produce linseed oil and linseed meal. In Egypt, flax is cultivated as two purpose (seeds for oil and stems for fiber).

Salinity is a common environmental challenge in the worled and it is one of the main problems that limit agricultural production. Sairan and Tyagi (2004).

The main objective of this work aimed to evaluate three flax cultivars under soil salinity conditions. EL–kady *et al.* (2010), indicated that Sakha3 and Sakha4 varieties exceeded means of the check varieties Sakha1 and imported Belinka for straw yield and fiber yield . Abo-Kaied *et al.* (2015) concluded that Giza 11 and Giza 12 varieties are a dual purpose type for straw, fiber and oil yields. They may replace the low yielding cultivars Giza 8 and Sakha 1. Kineber *et al.* (2015) demonstrated that Sakha5 and Sakha6 varieties were higher significantly in straw yield, seed yield, fiber yield, oil yield, fiber and oil ratio. Sorour *et al.* (2015) reposted that Giza 9 cultivar surpassed Sakha 3 cultivar in most of studied characters, whereas Sakha 3 exceeded Giza 9 cultivar in fiber yield/fed and quality characters. Kumar *et al.* (2018) found that genotypes significantly differed in days to 50% flowering, days to maturity, height of plant , No. of primary branches/plant, No. of secondary branches/plant, No. of capsules/plant, No. of seeds/plant, 1000-seed weight, biological yield/plant, harvest index, oil content and seed yield/plant.

Flax plants responded to nitrogen fertilizer, where it was sensitive of emergence and seed yield (Marschner, 1995 and Lafond *et al.*, 2003). Abd El-Dayem and El-Borhamy (2015) showed that fertilizing flax plants with 75 kg N/fed significantly increased height of plant , length of technical , straw, fiber and seed yields per plant and per feddan, length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. of seeds/plant, fiber length, fiber fineness and seed oil content and produced the maximum valuesas compared with without nitrogen. Abdel-Galil *et al.* (2015) found that the highest mineral nitrogen fertilizer rate (178.5 kg N/ha) had the maximum valuesof length of technical , diameter of stem , No. of capsules/plant, No. of seeds/plant, 1000 – seed weight, seed yield per plant and per ha, straw and fiber yields per ha. Conversely, flax seed oil content was decreased by increasing mineral nitrogen fertilizer rates. Dohat *et al.* (2017) reported that The oil content was recorded higher with application of nitrogen at the rate of 30 kg N/ha.

Phosphorus play important role in energy storage and transfer within the plant (Dick, 2011). Emam and Dewdar (2015) reported that add different treatments of phosphorus were significantly affected straw, seed and oil yields. Xie *et al.* (2016) showed that the application of phosphorus fertilizer (30 kg P/ha) give the maximum No. of capsules/plant, seed weight/plant, seed yield and oil yield by 20, 19, 44, and 56%, respectively, as compared with the control treatment. Patil *et al.* (2018) presented that used 40 kg phosphorus/ha recorded the maximum values of yield contributing characters No. of capsules/plant, seed yield/plant, seed yield/ha, straw yield/plant and straw yield/ha which was significantly superior over its lower levels.

Leilah *et al.* (2003) revealed that adding 60 kg N + 15 kg P_2O_5/fed significantly increased height of plant , length of technical , straw, fiber and seed yields per plant and per feddan, length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. of seeds/plant, total fiber percentage, fiber fineness and seed oil content. Khajani *et al.* (2012) presented that used 90 and 120 kg/ha of nitrogen and phosphorus, respectively significantly increased No. branches/plant, No. of capsules/plant and seed yield.

The main objective was to study reaction of three flax cultivars to different levels of nitrogen and phosphorus fertilizers on yields and its components as well as technological characters of three flax cultivars under saline soil conditions in Kafrelshiekh.

MATERIALS AND METHODS

The present study was worked out at the Experimental Farm of Sakha Agricultural Research Station (El-Hamrawy), Agricultural Research Center (ARC),

Egypt in 2015/2016 and 2016/2017 seasons split-plot design was used with three replicates. The main-plots were allocated to three flax cultivars *i.e.* Sakha 3 (fiber flax cultivar), Giza 11 (dual purpose flax cultivar) and Sakha 5 (oil flax cultivar) and its pedigree was reported in Table 1.

Table 1. Type and pedigree of studied flax cultivars.

cultivars	Type	Pedigree
Sakha 3	Fiber	Belinka 2E × I.2096
Giza 11	Dual purpose	Giza 5 × I. C 235 (USA)
Sakha 5	Oil	I.370 × I.2561

The sub-plots were allocated to four combination treatments of nitrogen and phosphorus fertilizers *i.e.* 45 kg N + 15.5 kg P_2O_5/fed, 45 kg N + 22.5 kg P_2O_5/fed, 55 kg N + 15.5 kg P_2O_5/fed and 55 kg N + 22.5 kg P_2O_5/fed.

The N fertilizer (Ammonium Nitrate, 33.5 % N) at the a formerly mentioned rates was added in two different date (the first date before first irrigation and the second date before second irrigation). The P fertilizer (calcium-superphosphate, 15.5% P_2O_5) at the aforesaid rates was added during soil preparation to the experimental units.

Table 2. Some physical and chemical properties of the experimental site through 2015/2016 and 2016/2017 seasons.

Soil analysis		2015 / 2016	2016 / 2017
A: Mechanical analysis			
Clay (%)		40.75	41.05
Silt (%)		34.95	35.20
Sand (%)		24.30	23.75
Texture class		Clay	Clay
B: Chemical analysis			
pH		8.08	8.28
E.C. (mho/cm at 25 °C)		6.20	8.00
Organic matter (%)		1.45	1.25
Available nitrogen (ppm)		25.65	20.70
Available P (ppm)		10.17	11.45
Available K (ppm)		380.00	405.00
Cations (meq./100 g soil)	Ca^{++}	0.22	0.64
	Mg^{++}	17.20	19.00
	Na^{+}	19.00	16.55
	K^{+}	9.00	10.81
Anions (meq./100 g soil)	HCO_3^{-}	2.70	1.50
	Cl^{-}	22.00	23.66
	SO_4^{--}	20.72	21.84

The experimental field was prepared through two ploughings, compaction, division and then divided into the experimental units with dimensions as previously mentioned. Flax cultivars were sown by broadcasting method at the recommended rate of each cultivars on 12th and 16th of November in the first and second seasons, respectively.

Studied characters:

A- Yields and its components:

A.1- Straw yield and its components:

1. Length of technical (cm).
2. Diameter of stem (mm).
3. Straw yield (g/plant).
4. Straw yield (t/fed).
5. Fiber yield (g/plant).
6. Fiber yield (kg/fed).

A.2- Seed yield and its components:

1. Length of fruiting zone (cm).
2. No. capsules/plant.
3. 1000-seed weight (g).
4. No. of seeds/plant.
5. Seed yield (g/plant).
6. Seed yield (t/fed).

B- Technological characters:

1. Fiber length (cm/plant).
2. Total fiber % (%).
3. Fiber fineness (N.m.). It was determined using Radwan and Momtaz (1966) method according to the next equation: **N.m = N x L / G**

Where:

N = No. of fibers (20 Fibers each 10 cm long).

L = Length of fibers in cm.

G = Weight of fibers in mg

4. Seed oil content (%). It was estimated as described by A.O.A.C. (2007) by Soxhelt apparatus and petroleum ether 40 – 60 ċ as an organic solvent.

All obtained data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the split-plot design as published by Gomez and Gomez (1984) by using MSTAT statistical package. Least significant difference (LSD) method as described by Snedecor and Cochran (1980) was used to test the differences among means of treatment (5 % level of probability).

RESULTS AND DISCUSSION

1- Performance of cultivars:

From obtained results in Tables 3, 4 and 5, it could be noticed that there were significant differences in straw yield and its components (length of technical , diameter of stem , straw yield "g/plant", straw yield "t/fed", fiber yield "g/plant" and fiber yield "kg/fed"), seed yield and its components (length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. seeds/plant, seed yield/ plant(g) and seed yield "t/fed") and technological characters (length of fiber /plant, total fiber percentage, fiber fineness and seed oil content) among studied three flax cultivars *i.e.* Sakha 3 (fiber flax cultivar), Giza 11 (dual purpose flax cultivar) and Sakha 5 (oil flax cultivar) in either seasons.

Sakha 3 gave the best results other to flax cultivars under studied and produced the maximum values of length of technical , fiber yield per plant and per feddan, fiber length, total fiber % and fiber fineness in both seasons. While, Sakha 3 cultivar resulted in the lowest values of diameter of stem , length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. of seeds/plant, seed yield per plant and per feddan and seed oil content in both seasons.

Meanwhile, Giza 11 cultivar significantly superior other studied two flax cultivars and resulted in the maximum values of diameter of stem , straw yield per plant and per feddan, length of fruiting zone, No. of capsules/plant, 1000-seed weight, No. of seeds/plant, seed yield per plant and per feddan in first and second seasons. While, Giza 11 cultivar recorded the lowest principle of fiber fineness in the first and second seasons,

However, Sakha 5 cultivar gave the best results other to flax cultivars under studied and produced the maximum values of seed oil content and the lowest values of length of technical , straw yield per plant and per feddan, fiber yield per plant and per feddan, fiber length and total fiber % during 2015/2016 and 2016/2017 seasons.

The changes between the tested three flax cultivars could mainly be attributed to the differences in their genetical constitution and their response to the environmental under saline soil conditions . The results are in line with those demonstrated by Abo-Kaied *et al*. (2015), EL–kady *et al*. (2010), Kineber *et al*. (2015), Sorour *et al*. (2015) and Kumar *et al*. (2018).

Table 3. Length of technical, diameter of stem, straw and fiber yields per plant and per feddan as affected by nitrogen and phosphorus fertilizers levels of three flax cultivars under salinity stress during 2015/2016 and 2016/2017 seasons.

Characters	Length of technical (cm)		Diameter of stem (mm)		Straw yield (g/plant)		Straw yield (t/fed)		Fiber yield (g/plant)		Fiber yield (kg/fed)	
Treatments	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017
A- Flax cultivars:												
Sakha 3	63.35	62.35	1.568	1.536	1.288	1.263	3.035	2.990	0.191	0.201	144.8	143.9
Giza 11	62.59	61.59	1.996	1.953	1.543	1.521	3.079	3.017	0.179	0.176	135.6	134.6
Sakha 5	53.43	52.68	1.831	1.791	0.747	0.724	2.347	2.327	0.082	0.079	125.7	125.2
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD at 5 %	1.06	1.05	0.062	0.069	0.007	0.006	0.043	0.052	0.002	0.005	0.5	0.6
B- Nitrogen and phosphorus fertilizers levels:												
45 kg N + 15.5 kg P_2O_5/fed	53.32	52.66	1.586	1.552	0.902	0.877	2.561	2.518	0.109	0.106	131.2	130.5
45 kg N + 22.5 kg P_2O_5/fed	57.89	56.89	1.783	1.753	1.088	1.068	2.717	2.672	0.135	0.154	133.9	133.1
55 kg N + 15.5 kg P_2O_5/fed	61.75	60.75	1.903	1.841	1.289	1.262	2.871	2.831	0.165	0.161	136.4	135.6
55 kg N + 22.5 kg P_2O_5/fed	66.20	65.20	1.921	1.893	1.491	1.470	3.133	3.092	0.193	0.187	140.1	139.1
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD at 5 %	0.85	0.84	0.068	0.078	0.008	0.009	0.048	0.059	0.001	0.002	0.6	0.7
C- Interaction (F. test):												
A × B	*	*	NS	NS	*	*	*	*	*	*	*	*

Table 4. Length of fruiting zone, No. capsules/plant, 1000-seed weight, No. of seeds/plant, Seed yield per plant and per feddan as affected by N and P fertilizers levels of three flax cultivars under salinity stress during 2015/2016 and 2016/2017 seasons.

Characters	Length of fruiting zone (cm)		No. of capsules/plant		1000-seed weight (g)		No. of seeds/plant		Seed yield (g/plant)		Seed yield (t/fed)	
Treatments	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017	2015 /2016	2016 /2017
A- Flax cultivars:												
Sakha 3	5.78	5.56	6.64	6.27	5.63	5.61	38.28	36.09	0.216	0.203	0.247	0.227
Giza 11	10.27	10.10	10.77	10.37	8.32	8.29	83.76	80.68	0.698	0.670	0.349	0.329
Sakha 5	8.88	8.57	10.11	9.71	5.85	5.81	68.64	65.87	0.397	0.383	0.329	0.310
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD at 5 %	0.45	0.31	0.18	0.19	0.05	0.04	0.22	0.12	0.011	0.007	0.008	0.007
B- Nitrogen and phosphorus fertilizers levels:												
45 kg N + 15.5 kg P_2O_5/fed	6.39	6.13	8.21	7.82	6.46	6.40	50.33	48.10	0.340	0.323	0.210	0.190
45 kg N + 22.5 kg P_2O_5/fed	7.48	7.30	8.89	8.51	6.55	6.51	63.71	60.89	0.428	0.414	0.274	0.254
55 kg N + 15.5 kg P_2O_5/fed	8.72	8.53	9.75	9.37	6.63	6.60	69.77	67.06	0.483	0.462	0.329	0.309
55 kg N + 22.5 kg P_2O_5/fed	10.64	10.35	9.83	9.42	6.76	6.77	70.45	67.48	0.497	0.476	0.422	0.402
F. test	*	*	*	*	*	*	*	*	*	*	*	*
LSD at 5 %	0.27	0.30	0.05	0.08	0.06	0.03	0.34	0.21	0.010	0.008	0.005	0.005
C- Interaction (F. test):												
A × B	*	*	*	*	NS	*	*	*	*	*	*	*

2. Effect of NP fertilizers levels:

With respect to the produce of nitrogen and phosphorus fertilizers levels *i.e.* 45 kg N + 15.5 kg P_2O_5/fed, 45 kg N + 22.5 kg P_2O_5/fed, 55 kg N + 15.5 kg P_2O_5/fed and 55 kg N + 22.5 kg P_2O_5/fed straw yield and its components (length of technical , diameter of stem , straw yield "g/plant", straw yield "t/fed", fiber yield "g/plant" and fiber yield "kg/fed"), seed yield and its components (length of fruiting zone, No. capsules/plant, 1000-seed weight, No. of seeds/plant, seed yield "g/plant" and seed yield "t/fed") and technological characters (fiber length/plant, total fiber percentage, fiber fineness and seed oil content), it was significant in the two seasons growing of this study as presented in Tables 3, 4 and 5.

All studied characters of flax gradually increased as a result by increasing nitrogen fertilizer levels nitrogen and phosphorus fertilizers levels from 55 kg N + 22.5 kg P_2O_5/fed to 55 kg N + 15.5 kg P_2O_5/fed, 45 kg N + 22.5 kg P_2O_5/fed and 45 kg N + 15.5 kg P_2O_5/fed, except fiber fineness in both seasons. It was evident that, under the environmental conditions of this study, flax plants still responded to more levels of nitrogen and phosphorus fertilizers up 55 kg N + 22.5 kg P_2O_5/fed. Regarding fiber fineness as technological character, it had adverse trend of all studied characters.

These results may be attributed to nitrogen encourages plant to uptake other elements activating in soil, thereby growth of plants. Also, phosphorus greatly stimulates growth and reproduction, consequently enhancing growth measurements and all straw, fiber and seed yields components. Leilah *et al.* (2003), Khajani *et al.* (2012), Abd El-Dayem and El-Borhamy (2015), Abdel-Galil *et al.* (2015), Xie *et al.* (2016) and Patil *et al.* (2018) confirmed these results.

3. Interaction effect:

The obtained results indicate that there was significant effect due to the interaction between three flax cultivars. nitrogen and phosphorus fertilizers levels on 1000-seed weight and total fiber % (in the second season), length of technical at harvest, straw, fiber and seed yields per plant and per feddan, length of fruiting zone, No. of capsules/plant, No. of seeds/plant, fiber length and fiber fineness (in both seasons) as shown in Tables 3, 4 and 5. Illustrated data in table (6) indicated that Sakha3 flax cultivar had the maximum values of straw yield per plant and per

feddan from applied mineral fertilizing with 55 kg N + 22.5 kg P_2O_5/fed in both seasons followed by Giza 11 flax cultivar in both seasons. The data revealed that Sakha3 flax cultivar had the maximum values of fiber yield per plant and per feddan were resulted from mineral fertilizing with 55 kg N + 22.5 kg P_2O_5/fed in the first and second seasons obtained by using mineral fertilizing with (55 kg N + 15.5 kg P_2O_5/fed) in the same flax cultivar in both seasons. The maximum values of seed yield per plant and per feddan were showed from mineral fertilizing Giza 11 cultivar with 55 kg N + 22.5 kg P_2O_5/fed in both seasons as presented in Table 6. Mineral fertilizing Giza 11 cultivar with 55 kg N + 15.5 kg P_2O_5/fed considered as second best interaction treatment in both seasons about to seed yield per plant and per feddan.

Table 5. Fiber length, total fiber percentage, fiber fineness and seed oil content as affected by nitrogen and phosphorus fertilizers levels of three flax cultivars under salinity stress during 2015/2016 and 2016/2017 seasons.

Characters	Fiber length (cm/plant)		Total fiber (%)		Fiber fineness (N.m.)		Seed oil content (%)	
Treatments	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
A- Flax cultivars:								
Sakha 3	55.58	53.19	14.75	14.67	266.4	249.6	34.81	32.77
Giza 11	54.36	52.13	11.57	11.46	239.4	228.8	38.18	36.13
Sakha 5	39.91	37.54	10.81	10.88	240.4	229.4	41.07	38.88
F. test	*	*	*	*	*	*	*	*
LSD at 5 %	1.42	1.29	0.15	0.12	2.7	3.0	1.44	1.37
B- Nitrogen and phosphorus fertilizers levels:								
45 kg N + 15.5 kg P_2O_5/fed	45.92	43.52	12.02	12.04	255.8	240.7	37.19	35.09
45 kg N + 22.5 kg P_2O_5/fed	47.76	45.31	12.35	12.26	248.0	238.3	37.82	35.71
55 kg N + 15.5 kg P_2O_5/fed	50.81	48.46	12.58	12.47	246.9	235.0	38.06	35.98
55 kg N + 22.5 kg P_2O_5/fed	55.32	53.18	12.56	12.57	244.3	229.8	39.02	36.93
F. test	*	*	*	*	*	*	*	*
LSD at 5 %	1.83	1.52	0.14	0.11	1.2	2.0	0.83	0.85
C- Interaction (F. test):								
A × B	*	*	NS	*	*	*	NS	NS

Table 6. Straw, fiber and seed yields per plant and per feddan as affected by the interaction between three flax cultivars, nitrogen and phosphorus fertilizers levels under salinity stress, during 2015/2016 and 2016/2017 seasons.

Characters		Straw yield (g/plant)		Straw yield (t/fed)		Fiber yield (g/plant)		Fiber yield (kg/fed)		Seed yield (g/plant)		Seed yield (t/fed)	
Treatments		2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017	2015/2016	2016/2017
Sakha 3	45 kg N + 15.5 kg P_2O_5/fed	0.836	0.807	2.691	2.650	0.119	0.114	138.2	137.4	0.169	0.156	0.129	0.109
	45 kg N + 22.5 kg P_2O_5/fed	1.075	1.055	2.961	2.908	0.160	0.222	143.9	142.9	0.219	0.204	0.205	0.185
	55 kg N + 15.5 kg P_2O_5/fed	1.482	1.451	3.073	3.047	0.221	0.214	145.8	145.1	0.235	0.221	0.309	0.289
	55 kg N + 22.5 kg P_2O_5/fed	1.759	1.738	3.417	3.355	0.265	0.255	151.3	150.1	0.240	0.229	0.346	0.326
Giza 11	45 kg N + 15.5 kg P_2O_5/fed	1.337	1.316	2.874	2.800	0.151	0.150	132.4	131.3	0.545	0.526	0.256	0.236
	45 kg N + 22.5 kg P_2O_5/fed	1.492	1.472	2.994	2.924	0.169	0.167	133.8	132.8	0.699	0.665	0.317	0.297
	55 kg N + 15.5 kg P_2O_5/fed	1.587	1.558	3.219	3.146	0.187	0.183	138.0	136.8	0.762	0.733	0.345	0.325
	55 kg N + 22.5 kg P_2O_5/fed	1.755	1.736	3.231	3.200	0.209	0.204	138.4	137.5	0.787	0.755	0.479	0.459
Sakha 5	45 kg N + 15.5 kg P_2O_5/fed	0.534	0.507	2.119	2.104	0.058	0.054	123.1	122.6	0.307	0.286	0.245	0.225
	45 kg N + 22.5 kg P_2O_5/fed	0.696	0.676	2.196	2.185	0.076	0.073	123.9	123.5	0.366	0.373	0.300	0.280
	55 kg N + 15.5 kg P_2O_5/fed	0.798	0.778	2.321	2.300	0.088	0.085	125.6	125.1	0.452	0.431	0.332	0.312
	55 kg N + 22.5 kg P_2O_5/fed	0.960	0.936	2.750	2.720	0.107	0.103	130.5	129.6	0.464	0.443	0.441	0.421
F. test		*	*	*	*	*	*	*	*	*	*	*	*
LSD at 5 %		0.014	0.015	0.082	0.101	0.003	0.004	1.1	1.3	0.018	0.013	0.009	0.008

CONCLUSION

The results are in the same line with those obtained by Leilah, *et al*.(2003), Khaianiet, *et al* (2012), Abd El-Dayem and El-Borhamy (2015) and Emam and Dewdar (2015), It could be concluded that mineral fertilizing Giza 11 cultivar with 55 kg N + 22.5 kg P_2O_5/fed to give maximum seed yield and its components and mineral fertilizing Sakha 3 cultivar with 55 kg N + 22.5 kg P_2O_5/fed to maximizing straw and fiber yields under saline soil conditions in Kafrelshiekh governorate, Egypt.

REFERENCES

Abd El-Dayem, M.A. and Amal M.A. El-Borhamy (2015). Effect of nitrogen, phosphor and potassium fertilization on yield of flax and quality under sandy soils. J. Plant Production, Mansoura Univ., 6(6):

Abdel-Galil, M.A. ; Sanaa S. Hassan ; Amal M. Elmanzlawy (2015). Influence of three cropping sequences and mineral nitrogen fertilizer rates on flax productivity and profitability under different planting dates in sandy soil. J. of Plant Sci., 3(4): 176-184.

Abo-Kaied, H.M.H. ; R.A. Abd El-Halemm ; E.A.F. El-Kady ; Eman, A.A. El-Kady ; Amany. M.M. El-Refaie ; E.I. El-Deeb ; N.K.M. Mourad ; Maysa, S. Abd Al-Sadek ; A.M.A. El-Gazzar ; Amna, H. El-Sweufy ; G.H. El-Shimy ; M.E.A. Kineber ; Afaf, E.A. Zahana ; S.H.A. Mostafa ; E.E. Lotfy ; A.M. Hella ; S.Z. Zedan ; Sabah, A. Abo El-Komsan ; T.A. Omar ; A.M. Mousa ; Amal, M.A. El-Borhamy ; M.M. Hussain ; Sanai, S. Husssan ; E.E. El-Azzouni and A.E. Moawed (2015). Giza 11 and Giza 12; two new flax dual purpose type varieties. Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo, 23(2): 525-535.

A.O.A.C. (2007). Official Methods of Analysis. 18th Ed. Association of Official Analytical Chemists, Inc., Gaithersburg, MD, Method 04.

Dick, R.P. (2011). Methods of soil Enzymology. Soil science society of America, Madison, USA.

Dohat, M.P. ; R.A. Patel ; C.K. Desai and H.K. Patel (2017). Quality of linseed (*Linum usitatissimum* L.) influenced by irrigation and level of nitrogen. J. of Pharma. and Phytochem., 6(4): 1943-1944.

EL-kady, E.A.F.; Kineber, M.E.A., Mostafa, S.H.A.; Hella, A.M.; Eman, A.E. EL-kady.; Abd EL-Fatah,A.A.; Abou Zaid, T.A.; EL-Deeb,I.E.; Mousa, A.M.; Zedan, S.Z.A.; Abo- kaied, H.M.H.; Lotfy, E.E.;EL-Azzouni, A.M.A.;EL-Gazzar, A.A.; EL-Shimy, G.H.; Amany, M.M.EL-Refaie.; EL-Sweify, A.H.; Omar, T.A.; Afaf, E.A.Zahana.; Moawed,A.E.; Mourad, N.K.M.; Nasr EL-Din, T.;Gaafar, S.M.S.; EL-Farouk, M.; Hussein, M.M. and Sanai, S.Hassan. (2010). Studies on stability in two new flax varieties Sakha3 and Sakha4.J.Agrie.Res.Kafr EL-Sheikh Univ., 36 (2): 182-192.

Emam, S.M. and M.D.H. Dewdar (2015). Seeding rates and phosphorus source effects on straw, seed and oil yields of flax (*Linum usitatissimum* L.) grown in newly-reclaimed soils. Int. J. Curr. Microbiol. App. Sci., 4(3): 334-343.

Gomez, K.N. and A.A. Gomez (1984). Statistical procedures for agricultural research. John Wiley and Sons, New York, 2nd Ed., 68 P.

Khajani, F.P. ; H. Irannezhad ; M. Majidian and H. Oraki (2012). Influence of different levels of nitrogen, phosphorus and potassium on yield and yield components of flax seed oil (*Linum usitatissimum* L.) variety Lirina. J. of Medicinal Plants Res., 6(6): 1050-1054.

Kineber, M.E.A. ; E.A.F. El-Kady ; Eman, A. El-Kady ; S.H.A. Mostafa ; A.M.A. Hella ; S.Z.A. Zedan ; N.K.M. Mourad ; E.E. El-Azzouni ; A. M.M. El-Refaie ; M.S. Abd Al-Sadek ; A.M.A. El-Gazzar ; A.E.A. Zahana ; E.E. Lotfy ; H.M.H. Abo-Kaied ; G.H. El-Shimy ; M.M. Hussain ; A.E.I. El-Deeb ; A.M. Mousa ; S.A. Abo El-Komsan ; T.A. Omar ; S.S. Husssan ; R.A. Abd El-Halemm ; M.A.M. Abd El-Daim ; A.M.A. El-Borhamy and A.H. El-Swiefy (2015). "Sakha 5 and Sakha 6" two new high yielding varieties of flax. J. Agric. Res. Kafr El-Sheikh Univ., 41(4): 1367-1379.

Kumar, A. ; J. Kumar ; K.P.S. Tomar and P.K. Sharma (2018). Estimate heterosis for yield and yield components in linseed (*Linum usitatissimum* L.) germplasm. Intern. J. Curr. Microbiol. App. Sci., 7(2): 1602-1611.

Lafond, G.P. ; C.A. Grant ; A.M. Johnston ; D.W. McAndrew and W.E. May (2003). Nitrogen and phosphorus fertilizer management of no-till flax. Better Crops, 87(1): 6-11.

Leilah, A.A. ; A.T. El-Kassaby ; M.H. El-Hindi and T.A. Abu-Zaid (2003). Requirement of some flax cultivars from NPK fertilizers. Sci. J. of King Faisal Univ. (Basic and Applied Sci.), 4(2): 125-139.

Marschner, H. (1995). Mineral nutrition of higher plants. Academic press San Diego, USA.

Patil, S.S. ; S. S. Ransing ; S.D. Hiwale and S.J. Rasal (2018). Effect of phosphorus and sulphur management on growth and yield attributes of linseed. Intern. J. Curr. Microbiol. App. Sci., 6(Special Issue): 1147-1155.

Radwan, S.R. and A. Momtaz (1966). The technological properties of flax and methods of estimating them. El-Felaha J. (Farming) 46: 446-447 (in Arabic).

Sairam, R.K., and A. Tyagi (2004) Physiology and molecular biology of salinity stress tolerance in plants. Curr.Sci.,81 : 407 – 412.

Snedecor, G.W. and W.G. Cochran (1980). "Statistical Methods" 7th Ed. The Iowa State Univ. Press, Iowa, USA.

Sorour, S.Gh. ; M.H. Ibrahim and H.M. Kineber (2015). Effect of planting method on yield and its quality of two flax cultivars. J. Agric. Res. Kafr El-Sheikh Univ., 41(3): 820-829.

Xie, Y. ; X. Niub and J. Niu (2016). Effect of phosphorus fertilizer on growth, phosphorus uptake, seed yield, yield components, and phosphorus use efficiency of oilseed flax. Agron. J., 108(3): 1257-1266.

تأثير مستويات السماد النيتروجينى والفوسفاتى على المحصول والصفات التكنولوجية لثلاثة أصناف من الكتان تحت ظروف الأراضى الملحية

عبد الرحيم عبد الرحيم ليله[١]، محمد حسين غنيمة[١] ، محمد السيد قنيبر[٢] و إبراهيم حسن طلحة [٢]

[١] قسم المحاصيل ـ كلية الزراعة – جامعة المنصورة ـ مصر.

[٢] قسم بحوث محاصيل الألياف – معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة – مصر.

تم إجراء هذه الدراسة بمزرعة محطة البحوث الزراعية بسخا (الحمراوى)– محافظة كفر الشيخ – مركز البحوث الزراعية ـ الجيزة – مصر فى موسمن زراعيين (٢٠١٥/٢٠١٦ و ٢٠١٦/٢٠١٧) لبيان تأثير مستويات السماد النيتروجينى والفوسفاتى على المحصول ومكوناته وكذلك الصفات التكنولوجية لثلاثة أصناف من الكتان تحت ظروف الأراضى الملحية. وقد أجريت التجربة في تصميم القطع المنشقة فى ثلاث مكررات. حيث تم تخصيص القطع الرئيسية لأصناف الكتان وهى؛ الصنف سخا ٣ (كتان ألياف) ، الصنف جيزة ١١ (كتان ثنائى الغرض) والصنف سخا ٥ (كتان زيت). بينما تم تخصيص القطع الشقية لمستويات التسميد النيتروجينى والفوسفاتى وهى؛ ٤٥ كجم نيتروجين + ١٥.٥ كجم P_2O_5 / فدان ، ٤٥ كجم نيتروجين + ٢٢.٥ كجم P_2O_5 / فدان ، ٥٥ كجم نيتروجين + ١٥.٥ كجم P_2O_5 / فدان و٥٥ كجم نيتروجين + ٢٢.٥ كجم P_2O_5 / فدان. ويمكن تلخيص أهم النتائج المتحصل عليها كما يلي:* أظهرت نتائج هذه الدراسة تفوق الصنف سخا ٣ معنوياً على الأصناف الأخرى التي تم دراستها ، وأعطي أعلى القيم لصفات الطول الفعال ، محصول الألياف للنبات وللفدان ، طول الألياف ، النسبة المئوية للألياف ، ونعومة الألياف في كلا الموسمين. بينما تفوق الصنف جيزة ١١ على الأصناف الأخرى المدروسة كما أعطى أعلى القيم لصفات قطر الساق ، محصول القش للنبات وللفدان ، طول المنطقة الثمرية ، عدد الكبسولات / النباتات ، وزن ١٠٠٠ بذرة ، عدد البذور / النبات ، محصول البذور للنبات وللفدان في كلا الموسمين. كما تشير النتائج التي تم الحصول عليها من هذه الدراسة إلى تفوق الصنف سخا ٥ معنوياً على الأصناف الأخرى تحت الدراسة وأعطي أعلى القيم لمحتوى الزيت بالبذرة خلال موسمى الزراعة.* تشير النتائج إلى أن جميع الصفات المدروسة قد زادت تدريجيا نتيجة لزيادة مستويات السماد النيتروجينى والفوسفاتى ، باستثناء صفة نعومة الألياف في كلا الموسمين. حيث تم الحصول على أعلى القيم لجميع الصفات المدروسة وذلك بتسميد الكتان بـ ٥٥ كجم نيتروجين + ٢٢.٥ كجم P_2O_5 / فدان ، ما عدا صفة نعومة الألياف في كلا الموسمين. من خلال نتائج هذه الدراسة، يمكن التوصية بتسميد الكتان صنف جيزة ١١ بـ ٥٥ كجم نيتروجين + ٢٢.٥ كجم P_2O_5 / فدان للحصول على أعلى محصول للبذور ومكوناته والتسميد بنفس المعدلات للصنف سخا٣ للحصول على أعلى محصول قش وألياف وذلك تحت ظروف الأراضي الملحية بمحافظة كفر الشيخ، مصر.