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EFFECT OF DIFFERENT POTASSIUM AND NITROGEN FERTILIZER LEVELS ON GIZA 8 AND VIKING FLAX VARIETIES .

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ABSTRACT

Two field experiments were carried out at Tag El-Ezz Research Station Farm, Dakahlia Governorate during the two successive seasons of 1996/1997 and 1997/1998 , to study the effect of two potassium levels i.e. , 20 and 40 kg $k_2$0/faddan and the three nitrogen fertilizer levels of 30 , 50 and 70 kg/faddan on the two flax varieties namely Giza 8 and Viking . The results of this investigation could be summarized as follows:

1-Viking flax variety surpassed Giza 8 with significant differences concerning plant height, technical stem length, straw yield/plant, straw yield/faddan, fiber yield/plant and fiber yield/faddan in both seasons.

2-Applying 40 kg k_2o/faddan caused remarkable increases in straw yield and its components previously mentioned in comparison with the lowest potassium dose 20 kg/faddan in the two successive seasons.

3- There are gradual increases in all the six straw characters studied with increasing nitrogen fertilizer level from 30 up to 70 kg/faddan in both seasons.

4-The flax variety Giza 8 was superior over Viking in number of fruiting branches/plant, number of capsules/plant and seed yield/plant as well as faddan in the first and second seasons .

5- All the four seed characters under study increased with increasing potassium fertilizer level from 20 to 40 kg k_2o/faddan .

6-Fertilized flax plants with 50 kg N/faddan achieved highest mean values of seed yield and its components .

7-The maximum biological yield obtained by Viking variety when compared with the results got by Giza 8, but, the latest variety gained highest estimates regarding the economic yield and harvest index in both seasons.

8-The greatest estimates of biological yield, economic yield and harvest index resulted by adding 40 kg k_2o/faddan .

9- Biological yield/faddan increased with increasing nitrogen level from 30 to 70 kg/faddan, while the intermediate N level (50 kg N/faddan) caused highest estimates in economic yield and harvest index characters in both seasons .

10-The estimates of correlation coefficient (r) were highly significant and positive between fiber yield/faddan and each of straw yield/fad., fiber yield/plant , straw yield/plant, plant height and technical stem length , also the relationship between straw yield/faddan and each of fiber yield/plant , straw yield/plant , plant height and technical stem length . Moreover , the associations between seed yield/faddan and each of seed yield/plant, no., of fruiting branches and no. of capsules/plant were highly significant and positive , the same degree of significance had observed between either fiber yield/plant and each of straw yield/plant , plant height and technical stem length or between straw yield/plant and the two latest characters previously mentioned .

INTRODUCTION

Flax (*linum usitatissimum,* L.) belongs to best fiber crops group and ranked first between them in Egypt from several years ago since pharaon time . Flax grown for its two main products as fiber and seeds.

Great efforts had done to increase flax yield and its quality by the way of evolve new flax varieties and different agriculture treatments to achieve highest yield and best quality. Therefore, the main target of this study is to determine the optimum dose from potassium and nitrogen fertilizers for the two flax varieties Giza 8 and Viking, especially that the two fertilizer elements very necessary for plant growth and consequently higher fiber and seed yields. Many investigators observed varietal differences in flax such as Momtaz, *et al.* (1989), Kinaber (1991), Salama (1991), EL-Shimy *et al*. (1993) and Moawed (1996). Concerning potassium fertilizer effect, the following researchers indicated that adding k_2o to flax plants caused increases in fiber and oil yields , from of them Chepilkov, (1972) , EL-Zeiney *et al.* (1984), Puri and Jaipurkar (1989),Ving Singir and Ramoar (1994), EL_Sweify and Mostafa (1996) and Abou-Zaied (1997). Meanwhile, Abdel-Raauf *et al*. (1983), EL-Farouk *et al*. (1983), Nasr EL-Din *et al*. (1986) , Sahsah *et al*. (1986) , Samia (1987), Rafey *et al*. (1988) , Abd-Alla *et al*. (1989), Jain et al. (1989) , EL-Shimy *et al*. (1993), Leilah (1993) , Moawed (1996) and Abou-Zaied (1997) who found that increasing nitrogen fertilizer level increased also flax yield straw fiber and seeds . Moreover, many workers studied the phenotypic correlations between different flax characters such as EL-Shimy *et al*. (1993) and Moawed (1996) .

MATERIALS AND METHODS

Two field experiments were carried out at Tag El-Ezz Research Station, Dakahlia Governorate, during the two successive seasons of 1996/1997 and 1997/1998 to study the effect of different potassium and nitrogen fertilizer levels on the productivity of the two flax varieties namely Giza 8 (commercial variety and dual purpose type) and Viking (imported from Holland and represents fiber type) . Chemical and physical analysis of experimental soil are given in Table (1-a) . The average mean of the prevailed temperature during the two winter growing seasons as shown in Table (1-b). A split – split plot design with four replicates was used , the main plots were devoted

To the two flax varieties, the sub-plots were assigned to the two potassium levels i.e., 20 and 40 kg k_2o/fad. and the three nitrogen levels i.e., 30 , 50 and 70 kg N/fad. were confirmed to the sub sub-plots , which each plot area was 6 m^2(2x3m.)or $^1/_{700}$ faddan. Flax seeds were drilled in rows 15 cms . apart, seeds were sown on November 20th in the first season and on November 25th in the second one .The normal cultural practices of growing flax were used and the soil texture of the experimental farm was clay loam.

Table (1-a) Mechanical and Chemical analysis of the experimental field

Characters	Values	
	1st season	**2nd season**
E.C.E. ds/m	1.2	1.1
pH	8.1	8.1
Cations meq/100 g		
Ca ++	0.12	0.2
Mg++	0.26	0.39
Na +	0.46	0.45
K+	0.06	0.06
Anions meq /100 g		
Co3--	0	0
Hco3 -	0.36	0.4
So4 --	0.48	0.36
Cl-	0.33	0.34
Coarse Sand %	0.51	0.51
Fine Sand %	24.2	24.2
Silt %	24.5	24.5
Clay %	45.3	45.3
O.M %	1.4	1.4
CaCo2%	2.73	2.73
Texture	Clay	Clay

Table (1-b): Mean of minimum and maximum temperature (Cº) during 1996/1997 and 1997/1998 winter growing season at Tag El - Ezz location.

Month	1996/1997		1997/1998	
	Temperature (Cº)		Temperature (Cº)	
	Minimum	Maximum	Minimum	Maximum
October	18	28.7	15.6	30.8
November	13.6	24.3	13.1	25.7
December	17.7	28.7	9	21.7
January	8.5	21.2	7.9	19.7
February	7.9	19.3	9.1	22.1
March	8.7	20.8	7.4	21.1
April	11.1	24.7	11.9	28.4
May	13.4	31.5	16.5	30.8

At harvest, ten guarded plants grown at proper distances in each plot were taken to record the following characters:

A- Straw yield and its related characters :

1- Plant height (cm.).
2- Technical stem length (cm.).
3- Straw yield/plant (gm.).
4- Straw yield/faddan (ton) calculated from the plot area yield basis .
5- Fiber yield/plant (gm.).

6- Fiber yield/faddan (kg.), calculated from the plot area yield basis .

B- Seed yield and its related characters :

1- Number of fruiting branches/plant.
2- Number of capsules/plant.
3- Seed yield/plant (gm.).
4- Seed yield/faddan (ton).

C- Economical characters :

1- Biological yield/faddan (ton), calculated from the summation of straw and seed yield/faddan (W).
2- Economic yield (EY), the economic plant organ or more which the crop cultivated.
3- Harvest index (HI); the economic yield as percentage from the biological according to the following formula suggested by Wallace et al ; (1972) and Kallos (1988).

$$H.I = \frac{EY}{W} X100$$

Where : EY= Economic Yield
W= Biological yield

Statistical analysis:

Statistical analysis was carried out according to Sendecor and Cochran (1982). Mean values were compared at the 0.05 and 0.01 of significance and used the least significant differences test (L.S.D).

D- Correlation studies.

Interrelationships between different flax characters were calculated according to the following equation :

$$r = \frac{SP_{XY}}{\sqrt{SS_X . SS_Y}}$$

Where :

$$SP_{XY} = \Sigma XY - \frac{\Sigma x . \Sigma y}{n}$$

$$SS_X = \Sigma x^2 - \frac{(\Sigma x)^2}{n}$$

$$SS_Y = \Sigma y^2 - \frac{(\Sigma x)^2}{n}$$

The t. test was used to test the significance of (r) value .

RESULTS AND DISCUSSION

A- Straw yield and its related characters :

Mean values of six straw characters i.e., plant height, technical stem length , straw yield/plant, straw yield/faddan, fiber yield/plant and fiber yield/faddan as affected by flax varieties, potassium and nitrogen fertilizer levels in 1996/1997 winter growing season are presented in table (2).

Statistical analysis showed significant differences between the two flax varieties, potassium and nitrogen fertilizer levels in all the six traits under study .

Concerning the two flax varieties data illustrated that Viking ranked first and surpassed Giza 8 in all straw yield and its components. The average obtained were (99.1 and 83.7 cm.) for plant height, for technical stem length (93.3 and 78.3 cm.), straw yield /plant (1.061 and 0.862 gm.), straw yield/faddan (4.150 and 3.570 ton), fiber yield/plant (0.179 and 0.146 gm.), and finally fiber yield/faddan (705.587 and 606.958 kg.) for Viking and Giza 8, respectively.

Table (2): Mean values of straw yield and its related character as affected by flax varieties, potassium and nitrogen levels in 1996 /1997 season.

Characters / Treatment factors	Plant height (cm.)	Technical stem length cm	Straw yield / plant (gm).	Straw yield /fad (ton).	Fiber yield / plant (gm).	Fiber yield /fad (kg).	
Varieties							
Giza 8	83.7	78.3	0.862	3.57	0.146	606.958	
Viking	99.1	93.3	1.061	4.15	0.179	705.587	
F . Test	*	**	**	**	**	**	
L.S.D	10.24	8.09	0.109	0.095	0.018	33.156	
Potassium fertilizer							
20kg .K2o /Fed	86.4	81.2	0.916	3.626	0.155	616.512	
40Kg . K2o /fed .	96.4	90.5	1.007	4.94	0.17	696.033	
F.test	**	**	**	**	**	*	
L.S.D	3.86	2.94	0.068	0.21	0.008	34.123	
Nitrogen fertilizer							
30kg .N/fad	86.8	81.2	0.767	3.466	0.129	589.225	
50kg.N/fad	91.5	85.4	1.005	3.906	0.171	664.062	
70 kg.N/fad	95.8	90.9	1.109	4.209	0.188	715.531	
F .tset	**	**	**	**	**	**	
L.S.D	4.32	3.64	0.042	0.109	0.008	26.534	
Interactions							
VxP	N.S	N.S	N.S	**	N.S	**	
VxN	N.S	N.S	*	N.S	N.S	N.S	
PxN	N.S	N.S	N.S	N.S	N.S	**	
VxPxN	N.S	N.S	N.S	N.S	N.S	**	

Regarding potassium fertilizer levels effect, the highest estimates were recorded when flax plants fertilized with 40 kg k_2o/faddan, but the lowest ones obtained by applied 20 kg k_2o /faddan, by means that increasing potassium levels from 20 up to 40 kg k_2o caused remarkable increases in all straw characters studied . The mean values for the six traits in the same

arrangement previously mentioned were (86.4 and 96.4 cm.) for plant height ,(81.2 and 90.5cm.) for technical stem length , (0.916 and 1.007 gm.) for straw yield/plant, (3.626 and 4.940 ton) for straw yield/fad.,(0.155 and 0.170 gm.) for fiber yield/plant , while they were (616.512 and 696.033 kg.) for the latest trait namely fiber yield /faddan in relation to the lowest and highest potassium levels respectively .

With respect to nitrogen fertilizer levels effect, gradual increments had recorded in all characters studied when nitrogen levels increased from 30 towards the highest level at 70 kg N/fad. . The estimates for plant height were (86.8 , 91.5 and 95.8 cm.), technical stem length (81.2 , 85.4 and 90.9 cm.), straw yield/plant (0.767 , 1.005 and 1.109 gm.),straw yield/fad. (3.466 , 3.906 and 4.209 ton), fiber yield/plant (0.129 , 0.171 and 0.188 gm.) and finally fiber yield/fad. (589.225 , 664.062 and 715.531 kg.) by added 30 , 50 and 70 kg N/faddan , respectively .

Statistical analysis of the data showed that the interactions combination had insignificant effect in all straw yield and its components characters in the first season except with the interactions between varieties X nitrogen on straw yield/plant, varieties X potassium on straw yield/faddan, fiber yield/fad. and also between potassium X nitrogen on fiber yield/fad. .

Mean values of straw yield and its related characters as affected by flax varieties, potassium and nitrogen levels in 1997/1998 season are presented in Table(3) .

Table (3): Mean values of straw yield and its related characters as affected by flax varieties, potassium and nitrogen levels in 1997 /1998 season.

Characters / Treatment factors	Plant height (cm.)	Technical stem length cm	Straw yield / plant (gm).	Straw yield /fad (ton).	Fiber yield / plant (gm).	Fiber yield /fad (kg).
Varieties						
Giza 8	77.9	71.5	0.813	3.257	0.137	553.758
Viking	87	80.6	0.955	3.871	0.162	658.129
F . Test	*	*	*	**	*	**
L.S.D	6.49	5.73	0.09	0.183	0.012	31.222
Potassium fertilizer						
20kg .K2o /Fed	80.2	73.8	0.842	3.33	0.142	566.15
40Kg . K2o /fed .	48.7	78.4	0.926	3.798	0.157	645.737
F.test	*	*	**	**	**	**
L.S.D	4.43	3.71	0.048	0.222	0.008	38.025
Nitrogen fertilizer						
30kg .N/fad	76.3	70.5	0.702	3.159	0.119	537.156
50kg.N/fad	83.5	77	0.937	3.681	0.158	615.187
70 kg.N/fad	87.2	80.8	1.013	3.915	0.17	665.487
F .tset	**	**	**	**	**	**
L.S.D	1.25	1.7	0.044	0.173	0.008	25.455
Interactions						
VxP	N.S	N.S	N.S	N.S	N.S	N.S
VxN	N.S	N.S	N.S	N.S	N.S	N.S
PxN	N.S	N.S	N.S	N.S	N.S	N.S
VxPxN	N.S	N.S	N.S	N.S	N.S	N.S

All of the three treatment under study differed significantly between each other, variety similar trend appeared in this seasons data with the previous season's in Table (2) . Viking variety was superior to Giza 8 in all six traits studied, the highest potassium level at the rate of 40 kg k_2o/faddan caused higher estimates when compared with the lower one at the dose of 20 kg k_2o/faddan, in addition to increase nitrogen fertilizer levels from 30 up to 70 kg N/faddan resulted in gradual increases in all straw yield and its components.

Statistical analysis of the data appeared that the all interaction combination had no significant effect in all straw yield and its components characters studied in the second season in Table (3).

B- Seed yield and its related characters :

Mean values of four seed characters, i.e., and no. of fruiting branches/plant, no. of capsules/plant, seed yield /plant(gm.) and seed yield/faddan(ton) as affected by flax varieties , potassium and nitrogen fertilizer levels in 1996/1997 season were tabulated in Table(4) .

Statistical analysis appeared significant differences between the two flax varieties, potassium and nitrogen fertilizer levels in all four characters under study.

Table (4): Mean values of seed yield and its related characters as affected by flax varieties, potassium and nitrogen levels in 1996 /1997 season.

Characters Treatment factors	No. of fruiting branches /plant	No. of capsules /plant	Seed yield / plant (gm).	Seed yield /fad (ton).
Varieties				
Giza 8	7.2	6.3	0.268	0.502
Viking	5.6	4.2	0.174	0.349
F . Test	**	*	*	**
L.S.D	0.5	1.6	0.077	0.034
Potassium fertilizer				
20kg .K2o /Fed	5.9	3.9	0.184	0.371
40Kg . K2o /fed .	6.8	6.6	0.257	0.48
F.test	N.S	**	**	**
L.S.D	-	1.1	0.041	0.024
Nitrogen fertilizer				
30kg .N/fad	5.1	4.4	0.189	0.357
50kg.N/fad	7.1	6.2	0.27	0.537
70 kg.N/fad	6.9	5.2	0.204	0.382
F .tset	**	**	**	**
L.S.D	0.8	0.8	0.037	0.025
Interactions				
VxP	N.S	N.S	N.S	N.S
VxN	N.S	N.S	N.S	**
PxN	N.S	N.S	N.S	**
VxPxN	N.S	N.S	N.S	N.S

Concerning the two flax varieties, data illustrated that Giza 8 ranked first and surpassed Viking in all seed yield and its components . The average values were(7.2 and 5.6) for no. of fruiting branches/plant, (6.3 and 4.2) for no. of capsules/plant, (0.268 and 0.174 gm.) for seed yield/plant and (0.502

and 0.349 ton)for seed yield/faddan inrelation to Giza 8 and Viking varieties, respectively .

Regarding potassium fertilizer levels effect, the highest estimates were showed when flax plants fertilized with 40 kg k_2o/fad. but the lowest ones obtained by applying 20 kg k_2o/fad., by means that increased potassium fertilizer levels from 20 up to 40 kg. k_2o/fad. caused remarkable increases in all seed characters studied . The mean values for the four traits in the same arrangement previously mentioned were (5.9 and 6.8) for no. of fruiting branches/plant, (3.9 and 6.6) for no. of capsules/plant, (0.184 and 0.257 gm.) for seed yield/plant and (0.371 and 0.480 ton) for seed yield/faddan when applied 20 and 40 kg. k_2o/fad., respectively.

Concerning nitrogen levels effect, results showed gradual increments had recorded in all characters studied when nitrogen increased from 30 up to 50 kg nitrogen per faddan which increased no. of fruiting branches/plant from 5.1 to 7.1 , no. of capsules/plant from 4.4 to 6.2, seed yield/plant from 0.189 to 0.270 gm. and seed yield/faddan from 0.357 to 0.537 ton . Meanwhile, increased nitrogen level from 50 up to 70 kg/faddan decreased all seed yield characters studied, the reduction which happened as follow; no. of fruiting branches/plant from 7.1 to 6.9 , no. of capsules/plant from 6.2 to 5.2 , seed yield/plant from 0.270 to 0.204 gm. and seed yield/fad. from 0.537 to 0.382 ton concerning the two nitrogen doses of 50 and 70 kg N/faddan, respectively.

Statistical analysis of the data appeared that the interaction combination had insignificant effect on all seed yield and its components characters except with the interactions between varieties X nitrogen and potassium X nitrogen on seed yield/fad. which was significantly affected .

Mean values of seed yield and its related characters as affected by flax varieties , potassium and nitrogen fertilizer levels in 1997/1998 season are presented in Table (5) .

All of the three treatments under study differed significantly between each other, similar trend had also recorded in the first and second seasons in this case, by means that Giza8 variety surpassed Viking variety in all four traits studied i.e. no. of fruiting branches/plant (7.6 and 5.6), no. of capsules/plant (7.4 and 5.2), seed yield/plant (0.278 and 0.176 gm.) and seed yield/fad. (0.584 and 0.408 ton) for Giza 8 and Viking flax varieties , respectively . Meanwhile, the higher potassium level at rate of 40 kg k_2o/fad. caused higher estimates when compared with the lower one at the level of 20 kg k_2o/fad., averages obtained in this case showed that no. of fruiting branches/plant (6.1 and 7.2), no. of capsules/plant (5.4 and 6.9), seed yield/plant (0.187 and 0.266 gm.)and seed yield/fad.(0.453 and 0.540 ton) when applied 20 and 40 kg k_2o/fad., respectively . In addition to increase nitrogen fertilizer levels from 30 up to 50 kg N./fad. increased all seed yield characters and its components. Meanwhile, increasing nitrogen level from 50 up to 70 kg N./fad. decreased all seed yield characters with the mean values for no. of fruiting branches /plant (5.2, 7.7 and 6.9), no. of capsules/plant(5.2, 7.3 and 6.1), seed yield/plant (0.191 , 0.271 and 0.219 gm.) and seed yield/fad.(0.407 , 0.629 and 0.453 ton) when added 30 , 50 and 70 kg N./fad., respectively . The varietal differences in straw and seed flax characters which

observed in this study were reported before by many investigators such as Samia (1987), Momtaz, *et al*.(1989) Kinaber, (1991), El_Shimy, *et al.* (1993) and Moawed, (1996). For potassium fertilizer application, the results obtained from this study are in harmony with those obtained by Chepikov, (1972), El_Zeiney, *et al*.(1984), Ving Singir and Ramoar (1994), El_Sweify,*et al*. (1996) and Abou_Zaied (1997) who found that increasing potassium level caused an increment in most flax traits . Many researchers also comfirmed that increasing nitrogen fertilizer level resulted in raising straw and seed yield of flax , from Samia, (1987), Salama, (1991), El_Shimy, *et al*. (1993), and Abou_Zaied, (1997).

Statistical analysis of data showed that the interactions combination had insignificant effect on all seed yield and its component characters in the second season except varieties X potassium on no. of capsules/plant and varieties X nitrogen on seed yield/fad. , which reached the level of significance.

Table (5): Mean values of seed yield and its related characters as affected by flax varieties, potassium and nitrogen levels in 1997 /1998 season

Characters Treatment factors	No. of fruiting branches /plant	No. of capsules /plant	Seed yield / plant (gm)	Seed yield /fad (ton).
Varieties				
Giza 8	7.6	7.4	0.278	0.584
Viking	5.6	5.2	0.176	0.408
F . Test	**	*	*	**
L.S.D	0.8	1.2	0.043	0.036
Potassium fertilizer				
20kg .K2o /Fed	6.1	5.4	0.187	0.453
40Kg . K2o /fed .	7.2	6.9	0.266	0.54
F.test	*	**	**	**
L.S.D	0.7	0.6	0.044	0.022
Nitrogen fertilizer				
30kg .N/fad	5.2	5.2	0.191	0.407
50kg.N/fad	7.7	7.3	0.271	0.629
70 kg.N/fad	6.9	6.1	0.219	0.453
F .tset	**	**	**	**
L.S.D	0.5	0.5	0.027	0.034
Interactions				
VxP	N.S	*	N.S	N.S
VxN	N.S	N.S	N.S	**
PxN	N.S	N.S	N.S	N.S
VxPxN	N.S	N.S	N.S	N.S

C- Economical characters :

Estimates of economical flax characters as affected by varieties , potassium and nitrogen fertilizer levels in 1996/1997 and 1997/1998 seasons are presented in Table(6).

Analysis of variance indicated significant differences among varieties, potassium and nitrogen fertilizer levels in the three economical characters i.e., biological yield/fad., economic yield/faddan and harvest index in the two successive seasons .

Data illustrated that Viking variety was superior to Giza 8 in biological yield in both seasons, the mean values obtained were 4.500 and 4.280 ton for Viking, while Giza 8 recorded 4.072 and 3.841 ton in the two successive seasons, respectively. On the other hand, Giza 8 variety surpassed Viking concerning economic yield/faddan and harvest index in both seasons , the mean values were 1.108 and 1.054 ton for economic yield, while the harvest index estimates were 27.21 and 23.42 % in the first season, the respected estimates in the second one were 1.137 and 1.066 ton for economic yield, while harvest index recorded 29.60 and 24.91% for Giza 8 and Viking , respectively .

Table (6): Estimates of economical flax characters as affected by varieties, potassium and nitrogen fertilizer levels in 1996/1997 and 1997/1998 seasons

Characters	1996/1997			1997/1998		
Treatment factors	Biological yield (ton)	Economic yield (ton)	Harvest index %	Biological yield (ton)	Economic yield (ton)	Harvest index %
Varieties						
Giza 8	4.079	1.108	27.21	3.841	1.137	29.6
Viking	4.5	1.054	23.42	4.28	1.066	24.9
F . Test	**	**	**	**	**	**
L.S.D	0.066	0.032	0.007	0.168	0.034	0.012
Potassium fertilizer						
20kg .K2o /Fed	4.004	0.987	24.65	3.784	1.018	26.9
40Kg . K2o /fed .	4.575	1.176	25.7	4.338	1.185	27.32
F.test	**	**	**	**	**	N.S
L.S.D	0.078	0.029	0.006	0.238	0.021	-
Nitrogen fertilizer						
30kg .N/fad	3.833	0.945	24.65	3.567	0.943	26.44
50kg.N/fad	4.444	1.201	27.03	4.248	1.244	29.28
70 kg.N/fad	4.591	1.097	23.89	4.368	1.118	25.6
F .tset	**	**	**	**	**	**
L.S.D	0.106	0.032	0.006	0.17	0.044	0.009
Interactions						
VxP	**	**	N.S	N.S	**	N.S
VxN	N.S	**	**	N.S	**	**
PxN	N.S	**	N.S	N.S	*	N.S

Regarding potassium fertilizer levels effect, adding 40 kg k_2o/faddan caused remarkable increments in the three economical traits when compared with applying 20 kg. k_2o/faddan in both seasons . The estimates of biological yield, economic yield and harvest index when flax plants fertilized by 40 kg k_2o/faddan in the first season were 4.575 ton, 1.176 ton and 25.70 % , respectively . Meanwhile , the respective values obtained by adding 20 kg. k_2o/faddan were 4.004 ton, 0.987 ton and 24.65% . In the second season, the estimates for similar three economical characters arrangement were 4.338 ton, 1.185 ton and 27.32% for the treatment 40 kg. k_2o/faddan, but the respective values were 3.784 ton , 1.018 ton and 26.90% as resulted from added 20 kg. k_2o/faddan, respectively.

Concerning nitrogen fertilizer levels effect, there are gradual increases in biological yield with increasing nitrogen level from 30 up to 70

kg. N./faddan in both seasons . Meanwhile, added the intermediate nitrogen dose (50 kg N./faddan) achieved highest estimates either in economic yield/faddan or harvest index % in both seasons, the maximum biological yield/faddan obtained by adding 70 kg N./faddan with mean values of 4.591 and 4.368 tons in the first and second seasons, respectively . On the other hand, the respective and minimum mean values obtained by the lowest nitrogen level (30 kg. N./faddan) were 3.833 and 3.567 tons in the same successive seasons . Meanwhile, the greatest economic yield and harvest index traits were 1.201 ton and 27.03% in the first season, the estimates in the same arrangement of the two previous characters were 1.244 ton and 29.28% in the second one.

The interaction between varieties and potassium fertilizer showed highly significant effect on biological yield and economic yield in the first season, but only on economic yield in the second one . Similar significant interaction effect of varieties X nitrogen had observed on economic yield and harvest index in both seasons, while potassium X nitrogen had highly significant effect on economic yield character in the first season and only significant effect on the same character in the second one.

D-Correlation study :

Data in Table(7) showed correlation coefficients between ten flax characters. Fiber yield/faddan was positively and significantly correlated with each of straw yield/faddan, fiber yield/plant, straw yield/plant, plant height and technical stem length with r values of 0.887, 0.949 , 0.950,0.979 and 0.980 respectively, while the r values were positive and insignificant with no. of fruiting branches/plant (0.242) and no. of capsules/plant (0.119) and negatively correlated with seed yield/fad. (-0.023) and seed yield/plant (0.001).

Straw yield/faddan was significant and positive associated with fiber yield/plant (0.949), straw yield/plant (0.951), plant height (0.980) and technical stem length (0.895) . On the other hand it was positive and insignificant correlated with seed yield/plant (0.019), no. of fruiting branches/plant (0.243) and no. of capsules/plant (0.119) but negatively correlated with only seed yield/faddan (-0.179) .

Seed yield/faddan was correlated positively and significantly with seed yield/plant (0.912), no. of fruiting branches/plant (0.807) and no. of capsules/plant (0.884).While, it was positive and insignificant correlated with technical stem length (0.383) and negatively with fiber yield/plant (-0.001), straw yield/plant (-0.012) and plant height (-0.134) .

Fiber yield/plant correlated positively and significantly with straw yield/plant (0.999), plant height (0.896) and technical stem length (0.897) . On the other hand it was insignificant and positive with seed yield/plant (0.007), no. of fruiting branches/plant (0.396) and no. of capsules/plant (0.235).

Straw yield/plant recorded positive and significant correlation coefficients with plant height (0.896) and technical stem length (0.898) .On the other hand, it was positive and insignificant correlated with seed yield/plant (0.071),no. of fruiting branches/plant (0.393) and no. of capsules/plant (0.167) .

Seed yield/plant was positive and significant correlated with no. of fruiting branches/plant (0.806) and no. of capsules/plant (0.991) . Meanwhile, it was negatively correlated with plant height (-0.133) and technical stem length (-0.155).

Plant height was positively and significantly correlated with only technical stem length (r =0.999) and it was positive and insignificant correlated with no. of fruiting branches/plant (r =0.069), but it was correlated negatively with no.of capsules/plant (r =-0.016) .

The technical stem length trait showed positive and insignificant association with no. of fruiting branches/plant (r = 0.057) but it was negatively correlated with no. of capsules/plant (r = -0.037) .Number of fruiting branches/plant was positively and significantly correlated with no. of capsules/plant (r = 0.907) . These results were agreement with those obtained by Moawed (1996) and El_Shimy et. al. , (1993) .

Table (7): Simple correlation coefficients between the different flax recorded characters of Giza 8 and Viking cultivars (combined analysis of both 1996/1997 and 1997/1998 seasons).

	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Fiber yield/ fad (1) (kg)	** 0.887	N.S -0.023	** 0.949	** 0.95	N.S -0.001	** 0.979	** 0.98	N.S 0.242	N.S 0.119
Straw yield /fad (2) (ton)		N.S -0.179	** 0.949	** 0.951	N.S 0.019	** 0.98	** 0.895	N.S 0.243	N.S 0.119
Seed yield /fad (3) (ton)			N.S -0.001	N.S -0.012	** 0.912	N.S -0.13	N.S 0.383	** 0.807	** 0.884
Fiber yield/ plant (4) (gm)				** 0.999	N.S 0.007	** 0.896	** 0.897	N.S 0.396	N.S 0.235
Straw yield /plant (5) (gm)					N.S 0.071	** 0.896	** 0.898	N.S 0.393	N.S 0.167
Seed yield /plant (6) (gm)						N.S -0.13	N.S -0.16	** 806	** 0.991
Plant height (7) (cm)							** 0.999	N.S 0.069	N.S -0.02
Technical stem length (8) (cm)								NS 0.057	NS -0.04
No of fruiting branches /plant (9)									** 0.907
No. of capsules/plant (10)									- -

These previous results are in a great importance for the agronomist to be employed for producing fiber and seed yields under various potassium and nitrogen fertilizers to improve both flax products (fiber and seeds) to obtain highers quantity and quality from them .

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تـأثير مستويات مختلفة من البوتاسيوم والنتروجين على صنفى الكتان جيزه ٨ ، فيكنج

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أقيمت تجربتان حقليتان فى مزرعة محطة البحوث الزراعيه بتاج العز ــ محافظة الدقهليه خلال الموسمين المتعاقبين ١٩٩٦/١٩٩٧، ١٩٩٧/١٩٩٨ وذلك لدراسة تأثير مستويين من السماد البوتاسى (٢٠، ٤٠ كجم بو٢أ / فدان) وثلاثة مستويات من السماد النتروجينى (٧٠،٥٠،٣٠ كجم ن/ فدان) على صنفين من الكتان هما جيزه ٨ ، فيكنج ويمكن تلخيص النتائج المتحصل عليها من هذا البحث كما يلى :ـ

١- تفوق الصنف فيكنج على الصنف جيزه ٨ وبفروق معنوية فى صفات الطول الكلى ، الطول الفعال ، محصول القش / نبات ، محصول القش / فدان ، محصول الألياف / نبات ، محصول الألياف / فدان فى كلا الموسمين تحت الدراسة ..

٢- اضافة ٤٠ كجم بو٢أ / فدان أعطت أعلى تقديرات لصفة محصول القش ومكوناته السابقة الذكر أذا ما قورنت باضافة المستوى الأقل (٢٠كجم بو٢أ/ فدان) فى كلا الموسمين

٣- كان هناك زياده متدرجه فى صفة محصول القش والصفات المرتبطه بزيادة التسميد النتروجينى من ٣٠ حتى ٧٠ كجم ن/ فدان فى كلا الموسمين ..

٤- تفوق الصنف جيزه ٨ على الصنف فيكنج فى صفات عدد الفروع الثمريه / نبات ، عدد الكبسولات / نبات ، محصول البذره / بالنبات والفدان فى الموسمين ..

٥- زاد محصول البذره للنبات والفدان بزيادة التسميد البوتاسى من ٢٠ الى ٤٠ كجم بو٢أ/فدان ..

٦- أعلى متوسطات لصفات البذره الأربعه المذكوره سابقاً تحصل عليها بتسميد الكتان بـ ٥٠ كجم ن / فدان وكانت النتائج متطابقه فى الموسمين .

٧- تفوق صنف الكتان فيكنج على صنف جيزه ٨ فى المحصول البيولوجى بينما حدث العكس بالنسبه للصنفين فى المحصول الأقتصادى ودليل الحصاد فى الموسمين .

٨- اضافة ٤٠كجم بو٢أ / فدان أعطت أعلى تقديرات لكل من المحصول البيولوجى ، المحصول الأقتصادى ، دليل الحصاد عند المقارنه بالمستوى الأقل (٢٠كجم بو٢أ/ فدان) .

٩- زاد المحصول البيولوجى بزيادة مستوى التسميد النتروجينى من ٣٠ حتى ٧٠ كجم ن/فدان بينما اضافة المستوى الأوسط من التسميد النتروجينى (٥٠كجم ن/ فدان) حقق اعلى زياده فى المحصول الأقتصادى ودليل الحصاد فى كلا الموسمين .

١٠- كانت قيم معامل الأرتباط الظاهرى معنوية جداً وموجبة بين محصول الألياف لكل فدان وكل من محصول القش / فدان ، محصول الألياف / نبات ، محصول القش / نبات ، أرتفاع النبات ، الطول الفعال - وكانت العلاقه معنوية جداً وموجبة بين محصول القش / فدان وكل من محصول الألياف / نبات ، محصول القش / نبات ، أرتفاع النبات ، الطول الفعال- وكذلك العلاقه بين محصول البذره / فدان وكل من محصول البذره / نبات ، عدد الفروع الثمريه / نبات ، عدد الكبسولات / نبات- بالأضافه الى ان قيم الأرتباط الظاهرى كانت مرتعة جداً بين محصول الألياف / نبات وكل من محصول القش / نبات ، ارتفاع النبات ، الطول الفعال - وبين محصول القش / نبات وكل من أرتفاع النبات والطول الفعال .