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RESPONSE OF FLAX TO IRRIGATION FREQUENCE AND SOME MICRO-NUTERIENTS APPLICATION IN CALCAREOUS SOILS

I- YIELD, YIELD COMPONENTS AND QUALITY OF LAX

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ABSTRACT

Two experiments were conducted in calcareous soil of the farm of Nobaria Agric. Res. Station during 1999/2000 and 2000/2001 seasons to study the effect of irrigation frequency, microelement- nutrients and their interactions on yield, yield components and quality of the two local cultivars (Giza 7and Giza 8), in addition strain L.

The result can be summarized as the following:

1. The new strain 1 recorded the maximum values of seed and fiber yields per plant as well as per Fadden, while Giza 7 out yielded other flax cultivars in straw yield and recorded the highest values of fiber per-cent age and fiber fineness, but the new tested strain gave the longest fibers when compared with the other cultivars Giza 7 or Giza 8.
2. Irrigation frequency significantly affected on the all yield and its components, in addition to, fiber quality of flax cultivars. Data indicated that plants irrigated 7 times out yielded those irrigated 3 times in the yields of straw yield/ plant as well as per Fadden by 33.05 % and 26.78% respectively; while the increases of seed yield/plant (0.27 g.) and per Fadden (159.4 Kg.) produced from plants irrigated 7 times when compared with 3 times; the maximum fiber yield per plant or per Fadden (0.481 g and 0.538 ton) were obtained from plants gave 7 time irrigations.
3. Results indicated that micronutrients application improved the all flax yield and its components, in addition to quality trails. The highest value of straw yield (4.02 ton / fed) was obtained from new strain 1 when irrigated without deprivation and used micro- nutrients while the highest fiber yield (0.720 ton) was obtained from Giza 7 . When affected by the same previous factors; on the other hand, Giza 8. Recorded the highest yield of seed either per plant or per fed den by 0.88 g or 755.47 Kg. Respectively, when its plants did not submitted to water deprivation and treated with foliar microelements.
4. Giza 7. Recorded the highest values for both of fiber percentage and fiber fineness when its plants treated either micronutrients and irrigated without deprivation (fiber percentage) or irrigated only three times (fiber fineness) while new strain 1 gave the tallest fiber when did not submitted to water stress and treated with micronutrients.
5. The correlation coefficient (r) values between straw yield, seed yield or fiber yield and some related characters were recorded, the results, generally indicated that the flax breeder must give priority to selection for increasing plant height and technical stem length to increase either straw yield or fiber yield, on the other hand, must be interesting for no. of capsules, no. of seeds/capsule as well as per plant and 1000- seed weight improve seed yield in flax.

Keywords: Flax, Irrigation number, micronutrients, calcareous soil.

INTRODUCTION

Increasing the production of flax (*Linum usitalissimum,* L.) from the present limited area is a basic target. Therefore, the most developed varieties of high yielding potential with application of the best agronomic practices such as irrigation and using some of micronutrients.

Concerning to varietals differences, El-Sweify *et al* (1996 and 1997) and Arjun and Gururaj (1996) reported that genotypes differed significantly in the seed and fiber yields Foster *et al.* (1998) investigated the yield components of seven commonly cultivated linseed and they recorded significant differences between those cultivars.

Regarding water supply, several investigators reported that irrigation increased flax yield i.e. seed, straw and fiber as well as its components. El-Farouk *et al.* (1982) concluded that application of five irrigations increased flax plant higher, technical length, weight of fiber / plant as well as per fad. They added that the higher irrigation number gave the longest fibers and the highest fiber percentage. On the other hand, there was a trend of coarseness of fiber due to increasing irrigations numbers. Hassan and El-Farouk (1984), recorded significant increasing in number of capsules, 1000 seed weight and seed yield of flax according to increasing irrigation frequency due to shortening the interval between irrigation times. Tomar and Shrivastava (1987), Found that flax harvest index was highest in plants irrigated at the branching stage and lowest in those irrigated at the capsule formation stage. Gopalakrishna *et al.* (1996), Sated that eater stress at the branching and flowering stages(10- 40 and 41- 75) days after sawing, respectively decreased flax seed yield, while water stress at 76 days before harvesting decreased fiber yield. Singh *et al.*, (1997) recorded that yield components of linseed cv. Garima were highest with 4 irrigations. Mladenova (1998 b) found that morphological characteristics of length and the technological characterizes of fiber yield of flax Vikong cv. are traced by irrigation treatments. Foster *et al.*, (1998) reported that acute water deprivation imposed at 50% flowering proved highly detrimental to plant growth and affected plant height, capsule number seed and straw weights highly significantly.

Micro- nutrients play an important role in plant growth as a result of affecting many physiological processes in plant life. Consequently, yield of the treated crops may be increased and crop quality is improved. The effect of micro- nutrients on flax is discussed here. Botin (1964) concluded that Mn and Zn favoured plant growth. AboEl-Saod *et al.*,(1975), stated that application of $ZnSO_4$ as foliar spray caused an increase in plant height, straw yield, number of capsules per plant, seed index, seed yield and fiber fineness of flax. Author and Moraghan (1984) found that flax showed the largest responses to added Zn. El-Shimy *et al.*, (1986) they obtained significant increase in all flax characters when its plants sprayed with mixture of Zn, Mn and Fe. Qu *et al.*, (1988). Found that Mn- containing fertilizer enhanced the growth and development of flax plants at early growth stages. El- Sweify (1993), recorded that Zn application insignificantly increased technical stem length, length of top capsule zone, straw yield per plant as well as per fad., also she found slight and insignificant increases in seed yield and its components due to Zn application; while, fiber length and fiber fineness were significantly increased.

Therefore, the target of this investigation was to evaluate a new flax strain comparison in the two local cultivars Giza 7 and Giza 8 as affected by irrigation numbers and micro- nutrients application under the calcareous soil.

MATERIALS AND METHODS

This investigation was conducted in calcareous soil in the farm of Nubaria Agric. Res. Station during 1999/2000 and 2000/2001 seasons to study the effect of irrigation regimes, micronutrients and their interaction on yield, yield components and quality of two local cultivars Giza 7 and Giza 8 in addition to strain 1 (cross between 2467&65) which released by Fiber Crop Res. Section at Sakha Station by bedegre method.

The physical and chemical properties of cultivated soil were presented in Table (1).

Table (1): some soil properties of the investigated soil.

pH	EC dS/m	Soluble cations (meq/L)*				Soluble anions (meq/L)*			
		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{-}	HCO_3^{-}	Cl^{-}	SO_4^{--}
8.14	0.875	2.34	0.72	5.40	0.42	--	2.60	4.96	1.24
Coarse sand %	Fine sand %		Silt %	Clay %		$CaCO_3$ %	Textural class		
26.36	32.79		16.70	24.15		25.0	Sandy clay loam		

*** Soil: water (1:5) extracts (Jakson, 1970).**

Different irrigation numbers 2, 3, 5 and 7 (without deprivation of irrigation) distributed at certain growth stages, (Table 2) which released at I_1, I_2 , I_3 and I_4 respectively, were assigned to the main plots and micronutrients to sub-plots; the three cultivars located as sub-sub plot which was 2x3m ($6m^2$ in area) in which 70g of seeds of each flax cultivars were sown by broadcasting method on November 12and 17 in the first and second seasons, respectively and irrigation took place in the following day. Other cultural practices were carried out as usual. Micronutrients were applied as mixture of foliar spray containing Fe, Mn and Zn at concentration of 100g/200L/fad.in the sulphate form. It was carried out two times, after 60 and 75 days from sowing.

At full maturity, the single plant study was done on samples each of ten guarded plant taken at random from each sub-sub plot. Measurement included, plant height, technical length, No. of apical branches, No. of capsules per plant, No. of seeds per capsule, No. of seed per plant and straw, seed and fiber yield, bulk samples included all plants found in square meter in each sub-sub plot were used to study straw, seed and fiber yields per faddan, 1000-seed weight, fiber percentage, fiber length and fiber fineness in metrical number (NM) Radwan and Momtaz (1966).

Statistical analysis of the data was carried out according to Sndecor and Cochran (1969). A combined analysis was performed for each character over two seasons as described by Le clerg *et al.*, (1966).

RESULTS AND DISSCUSSION

Effect of different cultivars:

The response of flax yield, yield components and quality of three different flax cultivars, i.e. Giza 7, Giza 8 and new strain 1 were investigated and the results are recorded in Table (3). These results showed clearly that yield component characters under test responded significantly owing to different cultivars, These results also showed clearly that yield component characters under test responded significantly owing to different cultivars except with regard to plant height and no. of seeds per capsule traits; the new strain recorded the maximum values of the all yield component characters studied in comparison with other tested cultivars. The results added also that strain 1 out yielded the two other cultivars in seed yield /plant as well as per fad and fiber yield / plant and per fad while Giza 7. Out yielded Giza 8 and strain1 significantly in straw yield per plant as well as per fad. The increase in seed yield in kg/fad of the new strain over that of Giza7 and Giza8 was 8.20% and 5.72% respectively; while the increase in fiber yield in ton/fad of the same strain over the other tested cultivars was 6.61% and 9.42 % respectively.

Table (3): Effect of cultivars on flax yield, yield components and fiber quality (Combined analysis of 1999/2000 and 2000/2001 seasons).

Tested characters	Giza 7	Giza 8	Strain1	L.S.D at 5%
	Yield components			
Plant height in (cm)	110.763	111.368	112.749	n.s
Technical length (cm)	93.083	90.745	93.247	1.436
No. of apical branches	5.660	6.111	6.394	0.489
No. of capsules/plant	12.869	13.248	14.455	1.099
No. of seeds/capsule	6.263	6.378	6.754	n.s
No. of seeds/plant	81.260	85.119	99.603	18.982
1000-seeds weight(g)	7.715	7.976	8.001	0.145
Yield				
Straw yield (g /plant)	2.88	2.77	2.50	0.353
Seed yield (g /plant)	0.624	0.636	0.655	0.016
Fiber yield (g /plant)	0.378	0.419	0.438	0.030
Straw yield (ton /fad)	3.095	3.046	3.003	0.022
Seed yield (kg/fad)	601.121	617.367	654.818	4.027
Fiber yield (ton/fad)	0.466	0.452	0.449	0.008
Fiber quality				
Fiber percentage	15.55	15.17	15.04	0.149
Fiber length (cm)	89.295	87.698	91.135	1.925
Fiber fineness(NM)	211.020	209.904	205.125	n.s

It could be concluded that the differences in genetic constituents and potentiality which in turn affected growth habit as well yield components can explain these finding. The conclusions of El-Sweify *et al* (1996 and 1997); Arjun and Gururaj (1996); Kineber et al., (1997); Sachan *et al.*, (1997) and Foster *et al.*, (1998) support this work. Fiber quality aspics responded to varietal differences, fiber percentage and fiber fineness of Giza7. exceeded other two cultivars (Giza8 and Strain1); while new test strain gave the longest fibers in comparison with the other cultivars Giza7 and Giza8. It could be concluded that quality of flax fibers depends on genetic potential as well genetic make up of the material under test which in turn interact with environmental conditions. These results are in accordance with that of El-Hariri *et al*, (1996).

Irrigation regime effect:

Irrigation regime had a significant effect on flax yield, yield components and fiber quality traits as shown in Table (4). Plant irrigated seven or five times surpassed those received 3 or 2 irrigations in plant height and technical length. Water stress during vegetative stage and early flowering critically depressed length measurements. The decrease in length measurements accompanying lower number of irrigations may be attributed to the fact that rate of cell enlargement and stem elongation can be inhibited by water deficits (Slatyer, 1957). These findings are in line with those of Pande *et al.*, (1969), Moursi and El-Hariri (1977), Hassan and El-Farouk (1984) and Mladenova (1998b).

Significance trend was detected due to the effect of irrigation on the number of apical branches and no. of capsules per plant. The results indicated that plants irrigated 5 or more times produced the greatest number of apical branches and capsules per plant while those irrigated 3 or 2 irrigation times gave the lowest number of the previous characters. The decrease in number of capsules/plant with decreasing soil moisture might be due to the abortion of some flowers as a result of moisture stress which adversely affect different physiological process in such critical period. The results of capsules/plant are in accordance with those of Hassan and El-Farouk (1984) and Foster *et al., (*1998). The effect of irrigation times on the number of seed/capsule as well as per plant and 1000 seed weight had the same previous trend.

The effect of irrigation times on straw yield per plant and per fad was significant. The statistical analysis showed that the plants irrigated 7 times out yielded those irrigated 2 times in the yields of straw per plant and per fad by 33.05% and 26.78% respectively. The decrease in straw yields as a result of water stress, obtained by the draught at the vegetative stage or the beginning of flowering may be attributed to the fact that mineral nutrient uptake is frequently reduced to a considerable degree in stressed plant, which in turn reduced photosynthetic efficiency and consequently dry matter accumulation (Slatyer,1957). These findings were in a harmony of those Pande *et al.*, (1969), Hassan and El-Farouk (1984); Nagarja *et al.*;(1997), and Foster *et al.*, (1998).

The differences in irrigation times had a significant effect on seed yield per plant and per fad. (Table3). Application of seven irrigations revealed a significant superiority in seed yield/plant and per fad over five or the other irrigations. The increase in seed yield could be attributed to the increase in number of capsules/plant and 1000-seed weight as a results of increasing number of irrigation. The increases in seed yield/ plant and fad produced from plants irrigated 7 times compared with 2 times were 0.27g and 159.49 kg respectively. The obtained results by Prashar *et al*(1968) confirmed this finding who found that 1 irrigation applied at the flowering or grain development stage increased seed yield to 739 and 763 kg/ha respectively, compared with 389kg/ha on plots given no irrigation.

Table (4): Effect of irrigation regime on flax yield, yield components and fiber quality. (Combined analysis of 1999/2000 and 2000/2001 seasons).

Tested characters	Number of irrigation				L.S.D at 5%
	I_1 (2)	I_2 (3)	I_3 (5)	I_4 (7)	
Yield component					
Plant height (cm)	105.071	110.401	110.475	112.561	4.791
Technical length (cm)	86.677	89.663	90.737	102.737	1.968
No. of apical branches	5.514	5.939	6.373	6.394	0.776
No. of capsules/plant	12.286	12.369	14.172	15.268	2.396
No. of seeds/capsules	5.551	6.334	6.527	7.448	0.587
No. of seeds/plant	77.658	78.676	82.576	115.732	13.883
1000- seeds weight (g)	6.892	7.727	8.041	8.930	0.229
Yield					
Straw yield (g/plant)	1.943	2.099	2.822	2.902	0.323
Seed yield (g/plant)	0.495	0.612	0.682	0.765	0.039
Fiber yield (g/plant)	0.378	0.396	0.4239	0.481	0.066
Straw yield (ton/fad)	2.518	3.093	3.116	3.439	0.053
Seed yield (kg /fad)	526.451	608.700	636.646	685.944	6.538
Fiber yield (ton/fad)	0.423	0.434	0.454	0.538	0.015
Fiber quality					
Fiber percentage	13.040	14.140	16.540	17.280	0.588
Fiber length (cm)	84.717	87.482	87.676	97.629	1.974
Fiber fineness(NM)	235.819	205.843	196.969	196.099	7.958

Irrigation regimen exhibited a significant effect on fiber yield/plant and fad. Data stated that the higher moisture level in the root zone as a result of increasing number of irrigations increased fiber yield per plant as well per fad. statistical analysis indicated that fiber yield/plant increase gradually by increasing the number of irrigations and fiber yield/fad recorded the same trend; the maximum yields of fiber per plant and per fad obtained from 7 times irrigations were 0.481 g and 0.538 ton respectively. The increase in fiber production accompanying increased irrigation might have resulted from better growth measurements in terms of plant height and technical length. The obtained results agreed with those reported by Nordestgaad (1976) and Gopalakrishna *et al.*, (1996) who found that water stress at 76 days before harvesting decreased the fiber yield. From Table (4), data stated that irrigation numbers had a significant effect on fiber percentage, fiber length and fiber fineness. The greatest fiber percentage (17.28%) obtained from plant given seven irrigations; also the same irrigation numbers gave the highest fiber length by 97.629 cm. this means that abundance of available soil moisture in the root zone increased fiber length. This could be attributed to the elongation of ultimate fiber due to more water absorption. El-Farok *et al.* (1982) found that higher irrigation times gave the longest fiber. Contrary, increasing in irrigation number caused a trend of coarseness of fiber. This indicated that any factor which gives possibilities of heavier nutrition and accumulation of cellulose in fiber could affect fineness towards heavier weight for the given length of fiber recorded as metrical numbers. Hassan and El-Farouk (1984) confirmed these results.

Micronutrients effect:

Data in Table (5) showed that a significant effect of foliar application with mixture of Fe, Mn and Zn on the yield and its components in addition to the flax quality except no. of seeds and fiber yield traits which were insignificant. Micronutrients application significant increased length measurements of flax plant, the increases in plant height and technical length of flax plants as affected by micronutrients treatment in comparison with those untreated plant were 2.241 cm and 3.680cm respectively. These results are in harmony of those obtained by Bottini (1964); Abo El-Saod *et al.*, (1975); and El-Shimy *et al.*, (1986). Significant trend was detected due to the effect of micronutrients on the number of apical branches, no. of capsules per plant and 1000-seed weight, treated plant out yielded untreated ones in the above mentioned traits by 14.17%, 17.96% and 12.06% respectively. The effect of micronutrients on the yields of straw and seed per plant as well as per fad was significant. Data indicated that the treated plants gave the highest mean values of straw yield/plant and /fad by 3.754gm and 3.11ton respectively. Also, application micronutrients revealed a significant superiority in seed yield/plant and per fad over the yields of untreated plants. The increase in seed yield could be attributed to the increase in number of capsules/plant and 1000-seed weight as a result of microelement applications. Moraghan (1993) recorded that seed yield were increased by Zn treatment. Micronutrient applications exhibited a significant effect on flax fiber quality i.e. fiber percentage, fiber length and fiber fineness. The greatest value obtained from the above traits as affected by micronutrients were 15.97%, 91.99cm and 215.789NM respectively. Theses finding coincide with those obtained by Batagin and Beiyankina (1968), Mourad *et al.*, (1987).

Table (5): Effect of micronutrients on flax yield, yield components and fiber quality. (Combined analysis of 1999/2000 and 2002/2001 seasons).

Tested characters	Foliar	Without foliar	L.S.D at 5%
Yield component			
Plant height (cm)	113.748	111.507	0.666
Technical length (cm)	94.198	90.518	1.347
No. of apical branches	6.97	5.986	0.605
No. of capsules/plant	14.683	12.046	1.457
No. of seeds/capsules	6.553	6.377	n.s
No. of seeds/plant	89.016	88.304	n.s
1000- seeds weight (g)	8.936	7.858	0.188
Yield			
Straw yield (g/plant)	3.754	2.679	0.333
Seed yield (g/plant)	0.943	0.633	0.027
Fiber yield (g/plant)	0.414	0.409	n.s
Straw yield (ton/fad)	3.110	2.973	0.053
Seed yield (kg/fad)	620.389	608.481	3.088
Fiber yield (ton/fad)	0.482	0.462	n.s
Fiber quality			
Fiber percentage	15.97	15.13	0.107
Fiber length (cm)	91.991	88.361	3.423
Fiber fineness(NM)	215.789	201.576	4.738

IV Interaction effect:

Yield components:

A summary of the interaction effect of the three experimental factor is given in Table (6), where the highest values of the characters studied are given, in addition to the sequence of the applied treatments producing the highest values. The plant height was significantly affected by all order interactions and its highest value (125.82cm)was recorded by plants of strain(C_3) when irrigated without depravation (I_4) and treated with micronutrients; which released as (I_4*fol.*C_3). While, interaction effects were highly significant on the technical stem length which achieved the highest value by 107.17cm.from the same above mentioned second degree interaction (I_4*fol.*C_3). The numbers of fruiting branches and capsules per plant traits were insignificantly affected by the first order interaction (A*B), while high significantly affected by the rest interactions, the highest values were obtained at the second order interaction from plants of Giza 8 when irrigated without deprivation and treated micronutrients by 8.84 and 23.36 for no. of fruiting branches and no. of capsules respectively. With regard to seed components (no. of seed/capsule, no. of seed/plant and 1000-seed weight), (A*B) interaction effect was significant, whereas the rest interaction effects were high significant on these traits; the highest values were 8.63, 201.16 and 9.93 respectively which recorded from Giza 8 when irrigated without deprivation and treated with micronutrients.

Yield characters:

Straw yield as well as fiber yield per plant were insignificantly affected by the all first order interaction, but the second order interaction had significant effect on two above mentioned traits (straw yield and fiber yield/plant) and produced the highest values by gm and 0.66 gm/plant for the two characters respectively; from Giza 7 when treated by micronutrients and irrigated four times. Respecting straw yield as well as fiber per feddan high significantly responded with both order degree of interactions; whereas the highest value of straw yield (4.02ton/feddan) was obtained at the second order interaction from strain when irrigated without deprivation and used micronutrient while Giza 7 at the same two above mention factors gave the highest fiber yield per feddan by 0.720 ton

Fiber quality

Fiber percentage and fiber fineness high significantly affect by the all interaction treatments, whereas the highest values were obtained from Giza 7 treated with micronutrients and irrigated without deprivation or only two times for fiber percentage and fiber fineness traits respectively. While fiber length character response differed by the interaction treatments; the highest value was insignificantly recorded by (cm) from strain 1 when irrigated without deprivation and treated with micronutrients.

Table (6): Effect of irrigation regimen on flax yield, yield components and fiber quality (Combined analysis of 1999/2000 and 2000/2001seasons).

Tested characters	irrig*Mico		Irrig* culti		Micro*Cultiv		Irrig.*Micr.*cultv.	
	Highest value	Source	Highest value	Source	Highest value	Source	Highest value	Source
Yield component								
Plant height (cm)	118.30	I_4 x fol.*	125.20	I_4 x C_3*	11.47	Fol. X C_3*	125.82	I_4 x fol x C_3*
Technical length (cm)	96.73	I_3 x fol*.*	106.67	I_4 x C_3**	105.43	Fol. X C_3*	107.17	I_4 x fol x C_3**
No. of apical branches	· 6.81	I_2x fol.n.s	8.35	I_1 x C_2**	6.69	Fol. X C_3*	8.84	I_4 x fol x C_2**
No. of capsules/plant	21.46	I_3xfol. n.s	18.35	I_3 x C_2**	16.87	Fol. X C_2*	23.36	I_4 x fol x C_2**
No. of seeds/capsules	7.64	I_4 x fol.*	7.94	I_4 x C_2**	7.84	Fol. X C_2*	8.63	I_4 x fol x C_2**
No. of seeds/plant	159.77	I_3 x fol.*	147.68	I_3 x C_3**	134.33	Fol. X C_2*	201.16	I_4 x fol x C_2**
1000- Seeds weight (g)	8.55	I_4 x fol.*	9.41	I_3 x C_2**	9.76	Fol. X C_2*	9.93	I_4 x fol x C_2**
Yield								
Straw yield (g/plant)	3.21	II_3 xfol. n.s	3.65	I_3 x C_1n.s	3.07	Fol. X C_3*	3.77	I_3 x fol x C_1**
Seed yield (g/plant)	0.76	I_3 x fol*.*	0.80	I_3 x C_2*	0.83	Fol. X C_3*	0.88	I_4 x fol x C_2**
Fiber yield (g/plant)	0.51	I_3x fol.n.s	0.603	I_3 x C_1n.s	0.473	Fol. X C_3*	0.66	I_3 x fol x C_1**
Straw yield (ton/fad)	3.53	I_4x fol. **	3.770	I_4 x C_3*	3.57	Fol. X C_3*	4.02	I_4 x fol x C_3**
Seed yield (kg/fad)	657.79	I_4 x fol.**	746.64	I_4 x C_2**	616.2	Fol. X C_3*	7.55.47	I_4 x fol x C_2**
Fiber yield (ton/fad)	0.353	I_3 x fol.**	0.641	I_4 x C_2**	0.616	Fol. X C_3*	0.720	I_3 x fol x C_2**
Fiber quality								
Fiber percentage	19.01	I_4 x fol.**	19.09	I_4 x C_1**	18.06	Fol. X C_3*	21.69	I_4 x fol x C_1**
Fiber length (cm)	93.37	I_4 x fol*.	102.39	I_4 x C_3**	99.5	Fol. X C_3*	104.12	I_4xfol x C_3n.s
Fiber fineness(NM)	261.77	I_1 x fol.**	250.29	I_1 x C_1**	243.5	Fol. X C_3*	278.15	I_4 x fol x C_1**

Irrg. = I = irrigation
Cultiv. = C = cultivars
Micro. = Fol = with micronutrients

V- Correlation Studies :

The interrelationships between straw yield, seed yield, fiber yield, and other of flax characters i.e., plant height, technical stem length and no. of fruiting branches, no. of capsules/ plant, no. of seeds/ capsule as well as / plant, 1000- seed weight, fiber length, fiber percentage and fiber fineness are shown in Table (7). The correlation coefficient (r) values between straw yield and three flax components i.e., plant height, technical stem length, and no. of fruiting branches were positive and significant but were positive and insignificant with respect to no. of capsules, no. of seeds/ capsule as well as per plant, fiber length and fiber fineness. Mean while the straw yield association with 1000- seed weight, fiber percentage and seed yield were negative and insignificant, on the other hand straw yield was positively and high - significantly associated with fiber yield; these data indicated that the greater straw yield gave the greater fiber yield. The relationships between seed yield and each of plant height, technical stem length, no. of fruiting branches, fiber length and fiber fineness characters were negative and insignificant, but was negative and high – significant regarding fiber percentage (r = 0.776); The relationships between seed yield and no. of seeds/ plant was positive and significant, mean while, seed yield, positively and high significantly correlated with both of no. of seeds/ capsule and 1000-seed weight.

Data obtained illustrated that the phenolypic correlation between fiber yield and each of plant height; technical stem length were positive and significant while were positive and insignificant with the following traits; no. of fruiting branches, no. of capsules, 1000 – seed weight, fiber length and fiber percentage were positive but insignificant, on the other hand the fiber yield was negatively and significantly correlated with no. of seeds/ plant (r = 0.573).

Table (7): Phenotypic correlation coefficients between straw, seed and fiber yields with some flax characters:

Flax characters	Straw yield	Seed yield	Fiber yield
Plant height	0.655*	-0.271	0.66*
Technical stem length	0.520*	-0.448	0.555*
No. of fruiting branches	0.503*	-0.139	0.219
No. of capsule/plant	0.311	0.685*	0.442
No. of seed/capsule	0.091	0.709**	0.486
No. of seeds/plant	0.283	0.628*	-0.573*
100-seed weight	-0.083	0.812**	0.269
Fiber length	0.227	-0.480	0.066
Fiber %	-0.145	-0.776**	0.419
Fiber fineness	0.028	-0.239	-0.162
Straw yield	-	-	-
Seed yield	-0.131	-	-
Fiber yield	0.818**	0.066	-

The results generally, indicate that the flax breeder must give priority to selection for increasing plant height and technical stem length to increase either straw yield or fiber yield, while for the no. of capsules, No. of seeds/ capsule as well as per plant and 1000 – seed weight to improve seed yield in flax .

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استجابة محصول الكتان لعدد مرات الرى واضافة بعض العناصر الصغـــرى فــى الاراضى الجيرية.
١- المحصول ومكوناتة وصفات الجودة للكتان.

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اجريت تجربتان حقليتان فى الاراضى الجيرية بمزرعة محطة البحوث الزراعية بالنوبارية فـــى موسمى ١٩٩٩/٢٠٠٠ و ٢٠٠٠/٢٠٠١ وذلك لدراسة تأثير عدد مرات الرى واضافــة العنـاصر الغذائيـة الصغرى والتفاعل بينهما على المحصول ومكوناتة وصفات الجودة للصنفين التجاريين من الكتـــان (جـيزة٧ ،جيزة٨) بالاضافة الى السلالة الجديدة س١ .

تتلخص النتائج كما يلى:-

أعطت السلالة الجديدة س١ أعلى انتاجية من كل من البذور والالياف فـــى حيـن أن الصنـف التجارى جيزة ٧ قد انتج أعلى محصول من القش وأعلى نسبة مئوية من الالياف. كما سجل أعلى درجة مـن النعومة لهذه الالياف ذلك بالمقارنة بباقى الاصناف الاخرى.

أوضحت النتائج أن محصول الكتان الناتج من اضافة ٧ ريات تفوق عن استخدام ٣ ريـات فقـط وذلك بالنسبة لمحصول القش للنبات والفدان بنسبتى (٣٣,٥% و ٢٦,٦٨%) على الـــترتيب. فـى حيـن أن محصول البذرة قد زاد بمعدل (٠,٢٧جم/نبات و ١٥٩,٤٩كجم/فدان) وأعلى محصول من الاليـــاف بمعـدل ٠,٥٣٨ طن/فدان تم الحصول علية عند استخدام ٧ ريات ايضا.

أوضحت النتائج أن استخدام العناصر الصغرى أدى الى تحسين كل من انتاجية وصفات الجـــودة فى الكتان.

اعلى محصول من القش (٤,٠٢طن) قد تم الحصول علية من السلالة الجديـــدة س١ عنـد عـدم الحرمان من الرى واستخدام المغذيات الصغرى بينما اعلى محصول من الالياف بمعدل (٠,٧٢٠طن) قد تـم الحصول علية من الصنف التجارى جيزة ٧. فى حين أن الصنف التجارى جيزة ٨ قد اعطى أعلى محصـول من البذور عند استخدام المعاملات السابقة من الرى والعناصر الصغرى.

سجل الصنف التجارى جيزة ٧ أعلى نسبة الياف مع أعلى درجة نعومة عند اسـتخدام العنـاصر الصغرى . فى حين ان السلالة الجديدة س١ قد أعطت أطول الياف عندما لم تتعرض للحرمان مـــن المياه واضافة العناصر الصغرى لها.

أوضحت قراءات الارتباط البسيط أن هناك علاقة موجبة ومعنوية بين كـل مـن طـول النبـات والطول الفعال وبين محصول القش ومحصول الالياف. وأن هناك ايضا علاقـــات موجبـة ومعنويـة بيـن محصول البذور وكل من صفات عدد الكبسول للنبات- عدد البذور فى الكبسولة وايضا عدد البـذور للنبـات ووزن ١٠٠٠بذرة.