RESULTS AND DISCUSSION

I - Straw Yield And Its Related Characters :

1- Plant height :

Mean values of plant height as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995 - 1996 and 1996 -1997 are presented in Table (2) .

Analysis of variance indicated significant differences between the two flax varieties i.e Giza8 and Iriana as well as due to sowing dates and plant density treatments in both seasons.

Regarding flax varieties, results reveal that the imported Iriana variety was superior over Giza8 in relation to total plant height character in both seasons. The mean values obtained by Iriana cv were 94.25 cm in the first season and 107.82 cm in the second one when compared with the shorter flax plants obtained by Giza8 which recorded 77.92 and 91.53 cm in the two successive seasons, respectively . These results which appeared as varietal differences are due to the genetical make up for each flax genotype.

The above mentioned data agreed with those obtained by Yousef (1968), El-Farouk et al, (1982), El-Kalla and El-Kassaby, (1982), Salama, (1983), Momtaz et al, (1989), El-Shimy et al, (1993), Sharief, (1993), Moawed (1996) Abou Zaied(1997) and El- Shimy et al, (1997).

Table(2): Mean values of plant height (cm) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	78.57	80.57	83.37	80.84	90.33	95.97	98.61	94.97
	15 Nov.	76.07	78.75	79.12	77.98	87.96	91.57	95.77	91.77
	5 Dec.	73.92	74.92	75.97	74.94	85.27	87.57	90.74	87.86
Mean		76.19	78.08	79.49	77.92	87.85	91.70	95.04	91.53
Iriana	25 Oct.	94.90	98.30	101.85	98.35	103.64	111.49	117.25	110.79
	15 Nov.	89.25	93.55	99.30	94.03	102.27	108.54	116.93	109.26
	5 Dec.	81.02	93.05	97.10	90.39	95.99	104.98	109.34	103.43
Mean		88.39	94.97	99.41	94.25	100.63	108.33	114.50	107.82
Overall mean	25 Oct.	86.73	89.43	92.61	89.56	96.99	103.73	107.93	102.88
	15 Nov.	82.66	86.15	89.21	86.00	95.12	100.06	106.35	100.51
	5 Dec.	77.47	83.98	86.53	82.66	90.63	96.28	100.04	95.65
Mean		82.28	86.52	89.45	86.08	94.25	100.02	104.77	99.68

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.496	0.541
B (Sowing date)	0.4496	0.2446
C (Density)	0.4476	0.2304
A x B	0.7501	0.34125
A x C	0.74495	0.5247
B x C	0.7044	0.3657
A x B x C	1.096	0.564

Concerning sowing dates effect, results showed a gradual decrement in plant height with delaying sowing date from 25 Oct. to 5 Dec. Plant height decreased from 89.56 to 82.66 cm in the first season and from 102.88 to 95.65 cm in the second one as sowing date was delayed from 25 Oct. to 5 Dec.

The present results reveal that delaying sowing date after Oct.25 caused a remarkable reduction in plant height. This reduction may be due to the fact that flax plants did not have enough time to achieve their maximum vegetative growth which mainly affected plant height and produced shorter plants . These findings are in agreement with those obtained by Al-Shamma and El-Hassan(1969), El-Farouk et al (1980), El-Haroun et al (1982), Kwon et al (1988), and Moawed (1996).

Results showed also that there were gradual increments in total plant height when plant density increased from 1125 to 1875 seeds/m^2 showing mean values of 82.28, 86.52 and 89.45 cm in the first season for the plant densities 1125, 1500 and 1825 seeds/m^2 respectively. The corresponding estimates in the second season were 94.25,100.02 and 104.77 cm for the respective sowing rates. Similar results were also obtained by El-Hariri (1964), El-Nakhlawy (1975), El-Nakhlawy et al (1978), Gad and El-Farouk (1978), Salama (1988), Abd-Alla et al (1989), Kwon et al (1989), Mostafa (1990), Easson and Long (1992), El-Shimy et al (1993) El-Sweify (1993), Mahmoud (1993), Nada (1995) and Amany El-Refaie (1996) .

All interaction combinations of the treatments under study had significant effect on total plant height which means that the three factors studied depended on each other in affecting this character . It could be concluded that the tallest flax plants of Giza8 variety were obtained by sowing on 25 Oct. combined with the highest plant density (1875 seeds /m^2) . The mean values recorded were 83.37 and 98.61 cm in the first and second seasons ,respectively. On the other hand, the shortest flax plants were obtained by sowing flax on 5 Dec. and seeding rate 1125 seeds/m^2 with average height of 73.92 and 85.27 cm in the first and second seasons, respectively.

For Iriana variety the tallest plants were obtained by sowing flax on 25 Oct. at plant density of 1875 seeds /m^2 but the shortest ones were obtained when planting flax on 5Dec. combined with 1125 seeds/m^2 showing an average of 81.02 and 95.99 cm in the first and second seasons, respectively.

It could be concluded that the maximum plant height was recorded by Iriana variety when sown on Oct.25 and seeding with 1875 seeds/m^2, being 101.85 and 117.25 cm in the first and second seasons, respectively .

On the other hand , the shortest plants were recorded by Giza8 variety sown on Dec.5 and seeding with 1125 seeds/m^2 recording an average of 73.92 and 85.27 cm in the first and second seasons, respectively .

2- Technical stem length (cm):

Means of technical stem length as affected by sowing dates and seeding rates of two flax varieties in the two successive seasons 1995-1996 and 1996-1997 are shown in Table (3).

Results indicate that there were significant differences between the two flax varieties under study, namely, Iriana and Giza8. Iriana recorded taller technical stem length than Giza8 in both seasons with mean values of 75.44 cm in the first season and 89.06 cm in the second one when compared with the relatively shorter flax plants obtained by Giza8 which recorded 62.46 and 73.42 cm in the two successive seasons, respectively.

These previously mentioned results which appeared as varietal differences are in similar trend with those of total plant height. The present results agreed with those obtained by El-Farouk et al (1982), El-Kalla and El-Kassaby (1982), Salama (1983), El-Kady (1985), Hella et al (1986), El-Kady et al (1988) , Salama (1988), Sorour et al (1988), Kineber (1991), El-Shimy et al (1993), El-Sweify (1993), Sharief (1993), El-Sweify and Mostafa (1996), Moawed (1996) and El-Shimy et al (1997).

Concerning sowing dates effect, results showed a gradual reduction in technical ;length with delaying sowing date from 25 Oct. to 5 Dec., where technical length decreased from 71.99 to 65.81 cm in the first season and from 83.61 to 77.97 cm in the second one as

Table(3): Mean values of technical stem length (cm) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	63.07	64.77	66.82	64.89	72.71	75.53	79.27	75.83
	15 Nov.	61.12	63.25	63.57	62.65	70.85	74.49	76.25	73.86
	5 Dec.	59.32	60.00	60.25	59.85	68.74	70.75	72.24	70.58
Mean		61.17	62.67	63.55	62.46	70.77	73.59	75.92	73.42
Iriana	25 Oct.	76.45	78.95	81.90	78.95	85.20	92.28	96.79	91.41
	15 Nov.	71.60	75.05	79.77	75.62	84.68	89.75	96.78	90.40
	5 Dec.	65.60	74.70	75.00	71.77	78.56	86.95	90.63	85.38
Mean		71.22	76.23	78.89	75.44	82.81	89.66	94.71	89.06
Overall mean	25 Oct.	69.76	71.86	74.36	71.99	78.95	83.90	88.00	83.61
	15 Nov.	66.36	69.15	71.67	69.05	77.76	82.12	86.51	82.13
	5 Dec.	62.46	67.35	67.62	65.81	73.65	78.85	81.43	77.97
Mean		66.19	69.45	71.21	68.95	76.78	81.62	85.31	81.24

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.325	0.578
B (Sowing date)	0.3759	0.2225
C (Density)	0.4043	0.1744
A x B	0.598	0.5397
A x C	0.5286	0.4928
B x C	0.992	0.2865
A x B x C	0.992	0.4928

sowing date was delayed from 25 Oct. to 5 Dec. All differences in technical length due to sowing date were significant in both seasons. The present results are due to the fact that flax plants when sown later will not achieve an adequate vegetative growth as plants sown earlier .

Thus a reduction in technical stem length will be excepted with late planting. These results are confirmed with those obtained by El-Farouk et al (1980), Kwon et al (1988), Abou Zaied (1991) and Moawed (1996).

Concerning plant density, results illustrated a significant differences among the three plant densities in both seasons. Moreover, there are progressive increases in technical length with increasing the plant density from 1125 to 1500 and 1875 seeds/m^2 . The averages of technical stem length were 61.17, 59.34 and 63.55 cm in the first season, while in the second one the respective means were 70.77, 73.59 and 75.92 cm for Giza8 variety. For Iriana variety the means of technical stem length of the previously mentioned densities were 71.22, 76.23 and 78.89 cm in the first season, being 82.81, 89.66 and 94.71 cm in the second season, respectively. It is clear that the increase in plant density per unit area produced taller technical stem length with each of the two flax varieties under study. This behavior may be due to that flax plants at dense planting are searching for light which results in remarkable elongation. This finding is in harmony with those obtained by El-Nakhlawy (1975), El-Nakhlawy et al (1978), Gad and El-Farouk (1978), Zahran et al (1984), El-Shimy et al (1985), Hella et al (1986), Salama (1988), Mostafa (1990), El-Shimy et al (1993), Nada (1995) and Amany El-Refaie (1996) .

All interaction combinations of the treatments under study significantly affected technical length. It could be concluded that the tallest technical stem length plants of Giza8 variety were obtained by sowing on 25 Oct., combined with the plant density of 1875 seeds /m^2 where the mean values were 66.82 and 79.27 cm in the first and second seasons, respectively. On the other hand, the shortest technical stem length plants were obtained by sowing on 5Dec. at 1125 seeds/m^2, recording averages of 59.32 and 68.74 cm, in the first and second seasons, respectively. For Iriana variety, the tallest technical stem length plants were obtained by sowing flax plants on 25 Oct., at plant density of 1875 seeds /m^2, while the shortest technical stem length was obtained by the latest sowing date on 5 Dec., combined with the lowest plant density of 1125 seeds/m^2. The mean values of this trait were 65.60 and 78.56 cm, in the first and second seasons, respectively.

The second order interaction indicated that the maximum technical stem length was recorded by Iriana variety sown on Oct.25 and seeding with 1875 seeds/m^2 being 81.90 and 96.79 cm in the first and second seasons, respectively.

3- Main stem diameter (mm) :

Mean values of main stem diameter as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995 -1996 and 1996-1997 are presented in Table (4).

Table(4): Mean values of main stem diameter (mm) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	2.90	2.83	2.68	2.80	3.46	3.35	3.07	3.29
	15 Nov.	2.88	2.75	2.63	2.75	3.35	3.32	3.02	3.23
	5 Dec.	2..83	2.73	2.58	2.71	3.30	3.22	3.00	3.17
Mean		2.87	2.77	2.63	2.75	3.37	3.30	3.03	3.23
Iriana	25 Oct.	2.10	2.04	2.01	2.05	3.10	3.20	3.02	3.10
	15 Nov.	2.10	2.03	2.01	2.04	3.09	3.15	3.00	3.08
	5 Dec.	2.06	2.01	1.99	2.02	3.07	3.12	2.98	3.06
Mean		2.08	2.02	2.00	2.03	3.08	3.16	3.00	3.08
Overall mean	25 Oct.	2.50	2.43	2.34	2.42	3.27	3.27	3.04	3.19
	15 Nov.	2.49	2.39	2.32	2.40	3.22	3.23	3.01	3.15
	5 Dec.	2.44	2.37	2.28	2.36	3.18	3.17	2.99	3.11
Mean		2.48	2.40	2.31	2.39	3.22	3.22	3.01	3.15

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.041	Ns
B (Sowing date)	0.0257	0.0748
C (Density)	0.0285	0.0628
A x B	Ns	0.01388
A x C	0.05135	0.12445
B x C	Ns	Ns
A x B x C	Ns	Ns

Analysis of variance showed significant differences between the two flax varieties Giza8 and Iriana as well as due to sowing dates and plant density treatments in both seasons, except with the varietal differences in the second season which did not reach the level of significance .

Regarding flax varieties, Iriana variety recorded thinner measurements in both seasons, with the mean values of 2.03 mm in the first season and 3.08 mm in the second one when compared with the thicker plants obtained by Giza8 which recorded 2.75 mm in the first season and 3.23 mm in the second one. It must be mentioned that the thinner flax plants obtained by Iriana variety are considered as more superior plants for bast fiber production in comparison with the thicker ones which produce coarse fibers. Many investigators observed varietal differences in main stem diameter such as El-Farouk et al (1982), El-Kady (1985), Hella et al (1986), Salama (1988), El-Shimy et al (1993), El- Sweify (1993), Sharief (1993), Moawed (1996) and Abou Zaied (1997) .

Concerning sowing dates effect, results showed a gradual decrement in stem diameter with delaying sowing date from 25 Oct. to 5 Dec. in both seasons. The main stem diameter decreased from 2.42 to 2.36 mm in the first season and from 3.19 to 3.11 mm in the second one as sowing date was delayed from 25 Oct. to 5 Dec. . The results mentioned here may be due to the fact that late sown flax plants did not achieve their adequate vegetative growth and consequently produced thinner flax plants compared with early sown plants. These results confirm those obtained by Kwon et al (1988), Abou Zaied (1991) and Moawed (1996) .

Data indicated that the dense planting produced more thinner flax plants . The measurements of main stem diameter were 2.48, 2.40 and 2.31 mm in the first season being 3.22, 3.22 and 3.01 mm in the second one at the plant density of 1125, 1500 and 1875 seeds/m^2, respectively. This result indicate that lower plant density reduces competition among growing plants for light, water and nutrients and consequently thicker plants are produced. On the other hand, dense planting increase plant competition for environmental factors and induce elongation of plants and thinner plants are produced. These findings are in agreement with those obtained by El-Farouk (1968), Momtaz et al (1981), El-Shimy et al (1985), Hella et al (1986), Salama (1988), Abd-Alla (1989), Easson and Long (1992), El-Shimy et al (1993), El-Sweify (1993), Nada (1995), and Amany El-Refaie (1996).

The interaction between variety and density in both seasons and variety and sowing date only in second season had significant effect on main stem diameter but the interaction between sowing date and density as well as the second order interaction had no significant effect on main stem diameter . The maximum main stem diameter was obtained by sowing on 25 Oct., combined with plant density of 1125 seeds /m^2 in the two flax varieties in both seasons . The highest main stem diameter for Giza8 was 2.9 and 3.46 mm being 2.10 and 3.10 mm for Iriana , in the first and second seasons, respectively. On the other hand, the lowest mean values were 2.58 and 3.00 mm for Giza8 and 1.99 and 2.98 mm for Iriana in the first and second seasons, respectively which were obtained by sowing on 5 Dec. at the highest plant density (1875 seeds /m^2).

4 - Straw yield / plant (g) :

Mean values of straw yield / plant in the two successive seasons as affected by variety, sowing date and plant density are presented in Table (5).

Analysis of variance showed that there were significant varietal differences between the two flax varieties under study in both seasons. Plants of Iriana variety recorded higher mean values for straw yield/plant (3.16 and 3.66 g) than Giza8 (2.61 and 2.98 g) in the first and second seasons, respectively. These results agreed with those obtained by Salama (1983), Hella et al (1986),Salama (1988), Sorour et al (1988), Hella et al (1989), Kineber (1991), El-Sweify (1993), El-Kady et al (1995), Moawed (1996) and Abu Zaied (1997).

Results indicated that there were significant differences in straw yield/ plant, regarding sowing dates in both seasons. Straw yield/plant significantly reduced as sowing date delayed from 25 Oct. to 5 Dec. This character reduced from 3.00 to 2.77 g in 1995-1996 and from 3.48 to 3.12 g in 1996-1997 season as sowing date was delayed from Oct.25 to Dec.5 . This result may be due to positive effects of early sowing on plant height, stem diameter and all growth parameters which are reflected in dry matter accumulation in plant . These results are in harmony with those obtained by Kwon et al (1988) and El-Kilany et al (1994).

Table(5): Mean values of straw yield/plant (g) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	2.80	2.71	2.64	2.72	3.26	3.14	3.05	3.15
	15 Nov.	2.66	2.64	2.56	2.62	3.11	3.06	2.94	3.03
	5 Dec.	2.51	2.51	2.49	2.50	2.93	2.92	2.36	2.74
Mean		2.66	2.62	2.56	2.61	3.10	3.04	2.78	2.98
Iriana	25 Oct.	3.42	3.30	3.14	3.29	4.01	3.80	3.61	3.82
	15 Nov.	3.34	3.15	3.00	3.16	3.90	3.65	3.45	3.67
	5 Dec.	3.26	3.12	2.74	3.04	3.61	3.66	3.25	3.51
Mean		3.34	3.19	2.96	3.16	3.84	3.70	3.44	3.66
Overall mean	25 Oct.	3.11	3.00	2.89	3.00	3.63	3.47	3.33	3.48
	15 Nov.	3.00	2.90	2.78	2.89	3.50	3.35	3.20	3.35
	5 Dec.	2.88	2.81	2.61	2.77	3.27	3.29	2.80	3.12
Mean		3.00	2.90	2.76	2.89	3.46	3.37	3.11	3.32

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.037	0.064
B (Sowing date)	0.0211	0.0348
C (Density)	0.0181	0.0366
A x B	Ns	Ns
A x C	0.028	0.0715
B x C	0.0293	Ns
A x B x C	0.044	0.09

Data revealed that straw yield/ plant was significantly affected by plant density in the two successive seasons. Increasing plant density from 1125 to 1875 seeds/m^2 significantly reduced straw yield/plant in both seasons. The estimates obtained were 3.00, 2.90 and 2.76 g in the first season, being 3.46,3.37 and 3.11 g in the second season for the plant densities 1125, 1500 and 1875 seeds/m^2 respectively. Reduction in straw yield/ plant as a result of increasing plant density was obtained by El- Hariri (1964), Mokhtar (1965), El-Shimy et al (1985), Hella et al (1986), Salama (1988), Abd Alla et al (1989), Mostafa (1990), El-Shimy et al (1993), El-Sweify (1993), Mahmoud (1993), and Nada (1995).

All interaction combinations had significant effect on straw yield /plant in both seasons, except with the interaction between variety and sowing date in both seasons and sowing date and density in the second one which did not reach the level of significance. It is clear that the highest mean values of straw yield/ plant were obtained by sowing flax on 25Oct., combined with the lowest plant density of 1125 seeds/m^2. The interaction between variety and density indicated that Iriana variety was more sensitive for dense planting than Giza8. Results in Table 5 showed that increasing plant density from 1125 to 1500 and 1875 seeds/m^2 reduced straw yield / plant in 1995/ 96 season in Giza8 variety by 1.50 and 2.29 % respectively, corresponding to 4.49 and 7.21 % with Iriana variety.

In 1996 / 1997 season the reductions in straw yield / plant due to increasing plant density were 1.94 and 8.55 % with Giza8 as against 3.65 and 7.03 % with Iriana. This great variation indicates a quite different varietal response to plant density.

The second order interaction indicated that the maximum straw yield / plant was 3.42 and 4.01 g in the first and second seasons, respectively which were recorded by Iriana variety sown on Oct.25 and seeding with 1125 seeds/m^2.

On the other hand, the minimum straw yield / plant was recorded by Giza8 sown on Dec.5 and seeding with 1875 seeds/m^2, being 2.49 and 2.36 g in 1995-1996 and 1996 -1997 seasons, respectively.

5 - Straw yield (ton / fad) :

Mean values of straw yield (ton / fad) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995-1996 and 1996 - 1997 are presented in Table (6).

Analysis of variance indicated significant differences in straw yield/ fad between the two flax varieties i.e Giza8 and Iriana as well as due to sowing date and plant density treatments in both seasons.

Regarding flax varieties, the imported Iriana was superior over Giza8 in relation to straw yield (ton/ fad) in both seasons with mean values of 3.48 ton/ fad in the first season and 4.06 ton /fad in the second one, compared with Giza8 which recorded 2.87 and 3.33 ton/ fad in the two successive seasons, respectively. These results which appeared as varietal differences are due to the genetical make up of each flax variety. The above mentioned results are due to the better vegetative growth of Iriana variety and agree with those obtained by Salama (1983), Hella et al (1986), El-Kady et al (1988),Salama (1988),

Table(6): Mean values of straw yield/fad. (tons) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96				1996/97			
		Plant density			Mean	Plant density			Mean
		1125	1500	1875		1125	1500	1875	
Giza 8	25 Oct.	2.91	2.98	3.08	2.99	3.36	3.46	3.63	3.48
	15 Nov.	2.81	2.91	2.92	2.89	3.39	3.34	3.42	3.38
	5 Dec.	2.73	2.77	2.77	2.75	3.03	3.22	3.15	3.13
Mean		2.81	2.88	2.92	2.87	3.26	3.34	3.36	3.33
Iriana	25 Oct.	3.45	3.63	3.76	3.61	4.01	4.22	4.45	4.23
	15 Nov.	3.31	3.45	3.67	3.47	3.82	4.06	4.34	4.07
	5 Dec.	3.02	3.44	3.59	3.35	3.50	3.95	4.16	3.87
Mean		3.26	3.51	3.67	3.48	3.77	4.08	4.32	4.06
Overall mean	25 Oct.	3.18	3.30	3.42	3.30	3.68	3.84	4.04	3.85
	15 Nov.	3.06	3.18	3.29	3.18	3.60	3.70	3.88	3.73
	5 Dec.	2.87	3.10	3.18	3.06	3.26	3.58	3.59	3.48
Mean		3.04	3.19	3.30	3.18	3.51	3.71	3.84	3.69

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.0400	0.2000
B (Sowing date)	0.0227	0.0810
C (Density)	0.0181	0.0769
A x B	Ns	Ns
A x C	0.0399	0.1436
B x C	0.0399	Ns
A x B x C	0.4400	0.1880

Hella et al (1989), Momtaz et al (1989), El-Gazzar (1990). Kineber (1991), El-Shimy et al (1993), El-Sweify (1993), El-Kady et al (1995), El-Sweify and Mostafa (1996), Moawed (1996) and Abou Zaied (1997)

Concerning dates effect, the results showed a gradual decrement in straw yield (ton/ fad) with delaying sowing date from 25 Oct. to 5 Dec. Straw yield per faddan decreased from 3.30 to 3.06 ton / fad in the first season and from 3.85 to 3.48 in the second one as sowing date was delayed from 25Oct. to 5 Dec. The reduction in straw yield due to late sowing is mainly due the decrease in growth characters. The same trend was observed by El-Farouk et al (1980), El-Haroun et al (1982) and Kwon et al (1988) who reported an increase in straw yield due to early sowing of flax .

Results showed that there are progressive increases in straw yield per faddan with increasing plant density with the two flax varieties studied in both seasons.

The average values obtained for this character were 3.04, 3.19 and 3.30 ton/ fad in the first season, corresponding to 3.51, 3.71 and 3.84 ton/fad in the second season, for the plant densities 1125,1500 and 1875 seeds /m^2, respectively. It must be mentioned here, that the straw yield per plant discussed before decreased with increasing plant density, but straw yield / faddan showed an opposite trend.

This behavior occurred because of the great number of flax plants per faddan grown at the higher plant densities which compensate the lower straw yield / plant. These results are in harmony with those obtained by Horodyski and Sokolowski (1964),

Mokhtar (1965), El-Farouk (1968) El-Nakhlawy (1975), El-Nakhlawy et al (1978), Gad and El-Farouk (1978), Momtaz et al (1981),Zahran et al (1984), El- Shimy et al (1985), Hella et al (1986), Hassan and El-Farouk (1987), Salama (1988), Mostafa (1990), El- Shimy et al (1993), El-Sweify (1993), Mahmoud (1993), Nada (1995) and Amany El-Refaie (1996).

The interaction between varieties and density and the second order interaction had significant effect on straw yield /fad in both seasons. Also variety × density had significant effect on straw yield/ fad in the first season only . The maximum straw yield / fad was obtained by sowing on 25 Oct., combined with the highest plant density (1875 seeds/m^2) with the two flax varieties in the both seasons.

The interaction between variety and density was quite evident where Iriana variety showed greater response to plant density than Giza8. The increase in plant density from 1125 to 1500 and 1875 seeds/m^2 increased straw yield/ fad in 1995 / 96 season by 2.49 and 3.91 % with Giza8 compared with 7.8 and 12.58 % with Iriana. The corresponding increases in 1996 /1997 season in straw yield / fad due to increasing plant density were 2.45 and 3.07 % for Giza8 as against 9.81 and 12.38 % for Iriana. From this result the significant variety × density interaction is clearly demonstrated. The second order interaction indicated that the maximum straw yield/ fad was 3.76 and 4.45 t/ fad in the first and second seasons, respectively which were recorded by Iriana sown on Oct.25 and seeds at 1875 seeds/m^2 .

On the other hand, the minimum straw yield was 2.73 and 3.03 t/fad in the two successive seasons which was obtained by Giza8 sown on Dec.5 and second at 1125 seeds/m^2 .

6- Fiber yield / fad (kg) :

Means of fiber yield/ fad as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/1996 and 1996/1997 are presented in Table (7)

Analysis of variance showed that there was a significant difference between the two flax varieties under this study (Giza8 and Iriana) in the two seasons .

Results showed that the imported Iriana was superior over Giza8 in relation to fiber yield / fad in both seasons, with the mean values of 443.9 Kg in the first season and 495.99 Kg in the second one, when compared with the lower values obtained by Giza8, which recorded 306.89 and 410.72 Kg in the two successive seasons, respectively. These results are mainly due to the superiority of Iriana variety in the straw yield/fad .

The present results agree with those obtained by El-Kady et al (1988), Salama (1988), Momtaz et al (1989), El Gazzar (1990), Kineber (1991) and El- Shimy et al (1993).

Concerning sowing dates effect, results showed significant differences and a gradual decrement in fiber yield/ fad with delaying sowing date from 25 Oct. to 5 Dec.

Table(7): Mean values of fiber yield/fad. (kgs) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96				1996/97			
		Plant density			Mean	Plant density			Mean
		1125	1500	1875		1125	1500	1875	
Giza 8	25 Oct.	320.53	332.53	349.83	334.29	408.50	419.67	435.02	421.06
	15 Nov.	297.93	319.60	335.80	317.78	394.95	418.62	436.37	416.65
	5 Dec.	234.00	271.15	300.70	268.61	360.50	392.05	430.92	394.49
Mean		284.15	307.76	328.77	306.89	387.98	410.11	434.10	410.72
Iriana	25 Oct.	416.18	479.66	501.09	465.64	477.02	547.52	580.77	535.11
	15 Nov.	401.20	447.68	499.65	449.51	460.95	496.65	560.25	505.95
	5 Dec.	385.38	417.55	446.85	416.59	458.55	416.02	466.25	446.94
Mean		400.92	448.29	482.52	443.91	465.50	486.73	535.76	495.99
Overall mean	25 Oct.	368.36	406.10	425.46	399.97	442.76	483.34	507.89	477.99
	15 Nov.	349.56	383.64	417.73	383.64	427.95	457.63	498.31	461.29
	5 Dec.	309.69	344.35	373.77	342.60	409.52	404.03	448.58	420.71
Mean		342.36	378.03	405.66	375.40	426.74	448.33	484.93	453.33

L.S.D. 0.05	1995/96	1996/97
A (Varities)	4.9720	4.3060
B (Sowing date)	8.4660	4.5162
C (Density)	2.6988	4.9039
A x B	Ns	7.2713
A x C	5.9120	7.7385
B x C	4.3117	7.6238
A x B x C	6.3660	12.0120

A remarkable reduction in fiber yield/ fad, from 399.97 to 342.60 Kg in the first season and from 477.99 to 420.71 Kg in second one was recorded as sowing date was delayed from Oct.25 to Dec5. The results are excepted since straw yield was greatly reduced by delaying sowing date. Similar results were also obtained by El-Farouk et al (1980), Rosnovskii and Bondorenko (1985), Kwon et al (1988), Abou Zaied (1991) and Moawed (1996).

Fiber yield per faddan was significantly affected by plant density. Fiber yield increased with increasing the number of flax plants per unit area. The mean values obtained in this case were 342.36, 378.03 and 405.66 Kg / fad in the first season, while they were 426.74, 448.33 and 484.93 Kg / fad in the second one for the plant density of 1125,1500 and 1875 seeds /m^2, respectively. The present results are mainly due to the increase in straw yield due to the increase in plant density. Similar results were also obtained by Garber (1960), Mokhtar (1965), Sin et al (1975), Gad and El-Farouk (1978), Gubbeles (1978), Momtaz et al (1981), Zahran et al (1984), Khalil (1990), Subotinas (1991), Bassi and Badiyala (1992), El-Shimy et al (1993), Mahmoud (1993) and Amany El-Refaie (1996).

All interaction combinations of the treatments under study had significant effect on fiber yield / fad except the interaction between variety and sowing date in the first season which was non significant. It could be concluded that the highest mean values of fiber yield/ fad of Giza8 variety were obtained by sowing on 25 Oct. combined with plant density of 1875 seeds/m^2 with the mean values of 349.83 and 435.02 kg/fad in the first and second seasons, respectively. On the other hand, the lowest values of fiber yield / fad of Giza8 were

obtained when flax was sown on 5 Dec. at 1125 seeds/m^2, with averages of 234.00 and 360.50 kg /fad in the first and second seasons, respectively .

For Iriana variety, the highest mean values were obtained by sowing flax on 25 Oct. with a plant density of 1875 seeds/m^2 with average yield of 501.09 and 580.77 kg/fad in the first and second seasons, respectively. But the lowest mean values obtained when planting flax on 5Dec. combined with 1125 seeds/m^2 with averages of 385.38 and 468.55 kg in the two successive seasons, respectively.

The interaction between variety and density indicated that Iriana variety response to plant density was much greater than Giza8. Increasing plant density from 1125 to 1500 and 1875 seeds/m^2 increased fiber yield/fad by 8.31 and 15.70 % in 1995-1996 season, and 5.70 and 11.89 % in 1996-97 season, respectively with Giza8. The corresponding increases for Iriana were 11.82 and 20.35 % in the first season, and 4.56 and 15.09 % in the second season, respectively.

The interaction between sowing date and density indicated that the effect of sowing date on fiber yield / fad was more evident at the population density of 1500 seeds/m^2 where the yield reduction reached 15.21 and 16.41 % in the first and second seasons. respectively, due to delaying sowing from Oct.25 to Dec.5 .

The corresponding reductions in fiber yield were only 10.86 and 5.5 % in the two successive seasons at a density of 1125 seeds/m^2, being 12.12 and 11.68 % at 1500 seeds/m^2 in the two successive seasons .

The second order interaction showed that the highest fiber yield/ fad was produced by Iriana variety sown on Oct.25 and seeded at 1875 seeds/m^2, being 501.09 and 580.77 kg /fad in 1995 / 96 and 1996 / 97 seasons, respectively.

On the other hand, the lowest fiber yield was 234.00 in the first season and 360.50 kg / fad in the second one which was produced by Giza8 sown on Dec.5 and seeded at 1125 seeds/m^2 .

Generally it could be concluded that straw yield and its components indicated significant differences between the two flax varieties namely Giza8 and Iriana as well as among sowing dates and plant densities in both seasons, except with the main stem diameter trait which was significantly affected in the second season only .

Concerning the two flax varieties, Iriana variety surpassed Giza 8 and achieved maximum estimates in total plant height, technical stem length, straw yield/ plant as well as per faddan and fiber yield/ fad, but Iriana variety was thinner in stem diameter .

In respect to sowing dates effect, the early planting of flax (25^{th} October) increased vegetative growth period and was superior either when compared with the intermediate date (15^{th} Nov.) or the latest one (5^{th} Dec.) in all straw characters studied in both seasons.

For plant density effect, data illustrated that the greatest plant density per unit area (1875 seeds/m^2) recorded maximum estimates in total plant height, technical stem length, straw and fiber yields/faddan, while the same plant density resulted in minimum mean values in

relation to the main stem diameter and straw yield/ plant in comparison with the lowest plant density (1125 seeds /m^2) .

Meanwhile, sowing flax plants at the plant density of 1500 seeds/m^2 produced intermediate estimates between the highest plant density and lowest one .

II - Seed Yield And Its Related Characters:

1- Number of capsules / plant:

Mean values of number of capsules / plant as affected by sowing dates, plant density of the two flax varieties in the two successive seasons 1995 / 96 and 1996 / 97 are presented in Table (8).

Analysis of variance indicated significant differences between the two flax varieties i.e. Giza8 and Iriana only in the first season , while sowing date and plant density treatments, showed significant effect on number of capsules / plant in both seasons .

For flax varieties, results revealed that the local variety Giza8 was superior over Iriana in relation to number of capsules/plant in both seasons. The mean values of this character for Giza8 cv were 8.20 and 10.38 in the two successive seasons, when compared with the lower number of capsules/plant obtained by Iriana which recorded 6.41 and 7.91 capsules/plant in the two successive seasons, respectively. These results which appeared as varietal differences are due to genetical make up for each flax genotype, agree with those obtained by Spratt et al (1963) Salama (1983), El-Kady (1985), Salama (1988), Sorour et al (1988), Hella et al (1989), Kineber (1991),

Table(8): Mean values of number of capsules/plant as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	12.83	9.35	6.80	9.66	16.05	11.60	8.05	11.90
	15 Nov.	8.78	8.18	6.18	7.71	12.75	9.65	8.05	10.15
	5 Dec.	8.75	7.35	5.61	7.23	11.00	9.04	7.21	9.08
Mean		10.12	8.29	6.19	8.20	13.27	10.10	7.77	10.38
Iriana	25 Oct.	7.88	7.05	5.33	6.75	11.34	8.28	6.10	8.57
	15 Nov.	7.55	6.88	5.28	6.57	9.77	8.18	6.02	7.99
	5 Dec.	6.53	6.66	4.58	5.92	8.98	7.43	5.15	7.18
Mean		7.32	6.86	5.06	6.41	10.03	7.96	5.75	7.91
Overall mean	25 Oct.	10.35	8.20	6.06	8.20	13.69	9.94	7.07	10.23
	15 Nov.	8.16	7.53	5.73	7.14	11.26	8.91	7.03	9.07
	5 Dec.	7.64	7.00	5.09	6.57	9.99	8.23	6.18	8.13
Mean		8.71	7.57	5.62	7.30	11.64	9.03	6.76	9.14

L.S.D. 0.05	1995/96	1996/97
A (Varities)	1.2880	Ns
B (Sowing date)	0.5507	0.6783
C (Density)	0.6866	0.7876
A x B	1.2569	Ns
A x C	Ns	Ns
B x C	Ns	1.2085
A x B x C	Ns	Ns

El-Shimy et al (1993), El-Sweify (1993), Sharief (1993), Moawed (1996), Abou Zaied (1997) and El-Shimy et al (1997).

Concerning sowing dates effects, results showed a gradual decrements in number of capsules / plant with delaying sowing date from 25 Oct. to 5 Dec., with a range of 8.20 to 6.57 capsules / plant in the first seasons, and from 10.23 to 8.13 capsules / plant in the second one, respectively. The present results revealed that delaying sowing date after Oct.25 caused a remarkable reduction in number of capsules / plant . The same trend was observed by kwon et al (1988) and Samui and Bondopadhyay (1992).

Results showed that there were gradual decrements in number of capsules / plant when plant density increased from 1125 to 1500 and 1875 seeds /m^2. The mean values obtained were 8.71 , 7.57 and 5.62 capsules / plant for the plant density of 1125 , 1500 and 1875 seeds/m^2 respectively, in the first season being 11.64, 9.03 and 6.76 capsules / plant in the second season . The results agree with those obtained by Horodyski and Sokolowski (1964), El-Farouk (1968), El-Nakhlawy (1975), Gad and El-Farouk (1978), Momtaz et al (1981), Zahran et al (1989), El-Shimy et al (1985), Hella et al (1986), Salama (1988), Abd-Alla et al (1989), Mostafa (1990), Freer (1992), El-Shimy et al (1993), El-Sweify (1993), Mahmoud (1993), Nada (1995) and Amany El-Refaie (1996).

The interaction between variety × sowing date in the first season and sowing date × density in the second one had significant effect on number of capsules / plant but the remaining interactions did not reach the level of significance . In general, the highest capsules

number / plant for Giza8 variety was obtained by sowing on 25 Oct., combined with the lowest plant density (1125 seeds/m^2) with mean values of 12.83 and 16.05 in the two successive seasons. The lowest mean values were obtained by sowing flax on 5 Dec. at 1875 seeds/m^2 with averages of 5.61 and 7.21 in 1995 / 96 and 1996 / 97 seasons, respectively .

For Iriana variety , the highest capsules number was obtained by sowing flax on 25 Oct. with plant density of 1125 seeds /m^2 (7.88 and 11.34), but the lowest mean values were obtained when planting flax on 5 Dec., combined with 1875 seeds /m^2, the average being 4.58 and 5.15 capsules / plant in the two successive seasons , respectively .

2- Number of seeds / capsule :

Mean values of number of seeds / capsule as affected by sowing dates, plant density and two flax varieties in the two successive seasons of 1995/96 and 1996/ 97 are presented in Table (9).

Analysis of variance indicated significant differences between the two flax varieties i.e Giza 8 and Iriana as well as among sowing date and plant density treatments in both seasons.

Regarding flax varieties , results. revealed that Giza8 was superior over Iriana in number of seeds/capsule, in both seasons. The mean values obtained by Giza8 cv, were 7.02 and 8.30 seeds / capsule in the first and second seasons, respectively, when compared with the lower mean values obtained by Iriana which recorded 6.26 and 6.74 seeds / capsule in two successive seasons, respectively. These results agree with those obtained by Spratt et al (1963), Kumar and Singh

Table(9): Mean values of number of seeds/capsule as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	Mean	1996/97 Plant density 1125	1500	1875	Mean
Giza 8	25 Oct.	9.65	8.45	7.65	8.58	9.48	8.40	7.55	8.48
	15 Nov.	7.50	6.75	5.85	6.70	9.38	8.30	7.28	8.32
	5 Dec.	7.18	5.70	4.45	5.78	9.10	8.20	6.99	8.10
Mean		8.11	6.97	5.98	7.02	9.32	8.30	7.27	8.30
Iriana	25 Oct.	7.95	7.28	6.50	7.24	7.40	7.35	6.50	7.08
	15 Nov.	7.45	6.12	5.23	6.27	7.33	6.67	6.10	6.70
	5 Dec.	6.28	5.28	4.33	5.29	7.20	6.40	5.76	6.45
Mean		7.22	6.22	5.35	6.26	7.31	6.81	6.12	6.74
Overall mean	25 Oct.	8.80	7.86	7.07	7.91	8.44	7.87	7.02	7.78
	15 Nov.	7.47	6.44	5.54	6.48	8.40	7.48	6.69	7.51
	5 Dec.	6.73	5.49	4.39	5.54	8.15	7.30	6.37	7.27
Mean		7.66	6.59	5.66	6.63	8.31	7.55	6.69	7.52

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.6890	0.3810
B (Sowing date)	0.5084	0.1100
C (Density)	0.4547	0.1350
A x B	Ns	Ns
A x C	Ns	0.3434
B x C	Ns	Ns
A x B x C	Ns	Ns

(1967), Salama (1988), Hella et al (1989), Moawed (1996), Abou Zaied (1997) and El-Shimy et al (1997).

Concerning sowing dates effect, results showed a gradual decrement in number of seeds per capsule with delaying sowing date from 7.91 to 5.54 seeds / capsule in the first season and from 7.78 to 7.27 seeds / capsule in the second season for sowing on 25 Oct. and 5 Dec. respectively. It is clear that delaying sowing date after the first one caused relatively remarkable reduction in number of seeds / capsule as a result of reducing the vegetative growth period. Similar results were obtained by El-Haroun et al (1982), Kwon et al (1988) and Samui and Bondopadhyay (1992) .

Results showed that the number of seeds / capsule decreased with increasing plant density per unit area (from 1125 to 1875 seeds /m^2) with the mean number of 7.66, 6.59 and 5.66 seeds / capsule in the first season and respective estimates in the second one of 8.31, 7.55 and 6.69 seeds / capsule for the three plant densities of 1125 , 1500 and 1875 seeds / m^2. The reduction in seeds number / capsule is due to the increase in plant competition. Many investigators found similar results among them are Horodyski and Sokolowski (1964) and Abd-Alla et al (1989).

All interaction combinations of the treatments under study had no significant effect on this trait in both seasons, except variety × density interaction in the second one which reached the level of significance. It could be concluded that the highest mean values of number of seeds / capsule for Giza8 variety were obtained by sowing on 25 Oct. combined with the lowest plant density of 1125 seeds/ m^2

(9.65 and 9.48) seeds / capsule in both seasons, but the lowest mean values were obtained by sowing flax seeds on 5 Dec. at 1875 seeds /m^2 , with averages of 4.45 and 6.99 seeds / capsule in the two successive seasons, respectively. The same treatments which recorded either maximum number of seeds / capsule or the minimum estimates for Giza 8 occurred also with Iriana variety. The corresponding values were 7.95 and 7.40 seeds / capsule as the highest values in 1995 / 96 and 1996 / 97 season, respectively, whereas the lowest values were 4.33 and 5.76, respectively.

3- Apical branching zone length :

Mean values of apical branching zone length trait as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995 / 1996 and 1996 / 1997 are presented in Table (10) .

Analysis of variance indicated significant differences between the two flax varieties i.e. Giza 8 and Iriana as well as sowing dates and plant density treatments in the first season only, but in the second one the differences in apical branching zone length did not reach the level of significance.

Regarding flax varieties, results revealed that the imported Iriana was the greater apical branching zone length in both seasons. The mean values obtained by Iriana were 18.80 cm in the first season and 18.75 cm in the second one when compared with the shorter flax plants obtained by Giza8 which recorded 15.40 and 18.10 cm in the two successive seasons, respectively. This finding is in harmony with those obtained by Spratt et al., (1963) , Kumar and Singh (1967),

Table(10): Mean values of apical branching zone length (cm) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density			1995/96 Mean	1996/97 Plant density			1996/97 Mean
		1125	1500	1875		1125	1500	1875	
Giza 8	25 Oct.	15.50	15.80	16.66	15.99	17.62	19.34	20.44	19.13
	15 Nov.	14.95	15.50	15.55	15.33	17.11	17.08	19.52	17.90
	5 Dec.	14.60	14.92	15.72	13.08	16.53	16.82	18.50	17.28
Mean		15.02	15.41	15.97	15.46	17.08	17.75	19.48	18.10
Iriana	25 Oct.	18.45	19.35	22.10	19.96	18.44	19.21	20.46	19.37
	15 Nov.	17.65	18.50	19.95	18.70	17.59	18.79	20.15	18.80
	5 Dec.	15.42	18.35	19.53	17.76	17.43	18.03	18.71	18.05
Mean		17.17	18.73	20.52	18.80	17.82	18.67	19.77	18.75
Overall mean	25 Oct.	16.97	17.57	19.38	17.97	18.03	19.27	20.45	19.25
	15 Nov.	16.30	17.00	17.75	17.02	17.35	17.93	19.83	18.37
	5 Dec.	15.01	16.63	17.62	16.42	16.98	17.42	18.60	17.66
Mean		16.09	17.06	18.25	17.14	17.45	18.21	19.62	18.42

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.2520	Ns
B (Sowing date)	0.1600	Ns
C (Density)	0.1293	Ns
A x B	Ns	Ns
A x C	0.2665	Ns
B x C	0.2111	Ns
A x B x C	0.3170	Ns

Salama (1983), El-Kady (1985), Salama (1988), Hella et al (1989) Moawed (1996) and Abou Zaied (1997).

Concerning sowing dates effect, results showed a gradual decrement in apical zone length with delaying sowing date from 25Oct. to 5 Dec. Apical zone length decreased from 17.97 to 16.42 cm in the first season, and from 19.25 to 17.66 cm in the second one as sowing date was delayed from Oct.25 to Dec5. The difference in the second season was not significant. Similar results were also obtained by El-Haroun et al (1982) and Samui and Bondopadhyay (1992).

The results showed also a gradual reduction in apical zone length when plant density increased from 1125 to 1875 seeds /m^2, with the mean values of 16.09, 17.04 and 18.25 cm in the first season for plant densities 1125,1500 and 1875 seeds /m^2 . The respective estimates in the second season were 17.45, 18.21 and 19.62 cm, respectively which were not significantly different. Similar results were also obtained by Horodyski and Sokolowski (1964) and Abd-Alla et al (1989).

All interaction combinations of the treatments under study had significant effect on apical branching zone length in the first season except that between variety and sowing date . In the second season all interactions had insignificant effect on this character . It could be concluded that the tallest apical branching zone length for Giza8 variety was obtained by sowing on 5th.Dec. combined with the lowest plant density (1875 seeds / m^2) with mean values of 16.66 and 20.44 cm in the first and second seasons, respectively. On the other hand, the shortest apical branching zone length was obtained by sowing flax

on 25 th Oct. at 1125 seeds/m^2 with averages of 14.60 and 16.53 cm in the two successive seasons, respectively.

For Iriana variety the tallest apical branching zone length was obtained by sowing flax on 5th Dec., at plant density of 1875 seeds / m^2 with average values of 20.10 and 20.46 cm in the first and second seasons, respectively, but the shortest ones were obtained when planting flax on 25th Oct., combined with 1125 seeds /m^2 with averages of 15.42 and 17.43 cm in the two successive seasons, respectively.

4-Seed yield / plant (g) :

Mean values of seed yield / plant as affected by sowing dates, plant density of the two flax varieties in the two successive seasons 1995 / 1996 and 1996 /1997 are presented in Table (11).

Analysis of variance indicated significant differences between the two flax varieties as well as due to sowing dates and plant density treatments in both seasons.

Regarding flax varieties, results revealed that Giza8 was superior over Iriana in relation to seed yield per plant in both seasons. The mean values obtained by Giza8 were 1.61 and 1.89 g when compared with Iriana which recorded 1.15 and 1.37 g in the two successive seasons, respectively. The present results agree with those obtained by Kumar and Singh (1967) Yousef (1968),Momtaz and Allam (1977), Momtaz et al (1980), El-Kady (1985), El-Kady et al (1988), Salama (1988), Hella et al (1989), El-Sweify (1993), Abou Zaied (1997) and El-Shimy et al (1997).

Table(11): Mean values of seed yield/plant (g) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density			1995/96 Mean	1996/97 Plant density			1996/97 Mean
		1125	1500	1875		1125	1500	1875	
Giza 8	25 Oct.	1.82	1.72	1.59	1.71	2.21	2.03	1.84	2.02
	15 Nov.	1.80	1.59	1.47	1.62	2.12	1.87	1.69	1.89
	5 Dec.	1.69	1.58	1.26	1.51	2.00	1.85	1.45	1.77
Mean		1.77	1.63	1.44	1.61	2.11	1.92	1.66	1.89
Iriana	25 Oct.	1.31	1.23	1.18	1.24	1.59	1.47	1.36	1.47
	15 Nov.	1.19	1.18	1.11	1.16	1.45	1.39	1.29	1.38
	5 Dec.	1.08	1.07	1.05	1.07	1.31	1.27	1.21	1.26
Mean		1.19	1.16	1.11	1.15	1.45	1.38	1.29	1.37
Overall mean	25 Oct.	1.56	1.47	1.38	1.47	1.90	1.75	1.60	1.75
	15 Nov.	1.49	1.38	1.29	1.39	1.78	1.63	1.49	1.63
	5 Dec.	1.38	1.32	1.15	1.28	1.65	1.56	1.33	1.51
Mean		1.48	1.39	1.27	1.38	1.78	1.64	1.47	1.63

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.0400	0.0470
B (Sowing date)	0.0166	0.0181
C (Density)	0.0168	0.0176
A x B	Ns	0.0441
A x C	0.0388	0.0434
B x C	0.0265	0.0278
A x B x C	0.0410	0.0430

Concerning sowing dates effect, results showed a gradual decrement in seed yield per plant with delaying sowing date from 25Oct. to 5 Dec. Seed yield per plant decreased from 1.47 to 1.28 g in the first season and from 1.75 to 1.51 g in the second one as sowing was delayed from Oct.25 to Dec.5 respectively . The present results revealed that delaying sowing date after Oct.25 caused remarkable reduction in seed yield per plant due to the reduction in the vegetative growth period. The present results agree with those obtained by El-Haroun et al (1982), Kwon et al (1988). Samui and Bondopadhyay (1992).

The results indicated that there are gradual decrements in seed yield per plant when plant density increased from 1125 to 1875 seeds /m^2 with the mean values of 1.48, 1.39 and 1.27 g in the first season respectively.

The respective estimates in the second season were 1.78, 1.64 and 1.47 g for the plant density of 1125 , 1500 and 1875 seeds/m^2 respectively, the reduction in seed yield / plant at dense planting is mainly due to the increase in plant competition . Similar results were also reported by El-Hariri (1964), Horodyski and Sokolowski (1964), El-Farouk (1968), Zahran et al (1984), Hella et al (1986), Salama (1988), Abd-Alla et al (1989), Mostafa (1990), Freer (1992), El-Shimy et al (1993), El-Sweify (1993), Nada (1995) and Amany El-Refaie (1996).

All interaction combinations of the treatments under study had significant effect on seed yield per plants except with variety × sowing date which was not significant in the first season. It means that the

three factors studied depended on each other in affecting this character. It could be concluded that the maximum mean values of seed yield/plant of Giza8 variety were obtained by sowing on 25 Oct. combined with the lowest plant density of 1125 seeds /m^2. The mean values recorded were 1.82 and 2.21 g in the first and second seasons, respectively. while the minimum values were obtained by sowing on 5 Dec., at 1875 seeds / m^2, with averages of 1.26 and 1.45 g in the two successive seasons, respectively.

For Iriana variety, the highest mean values were obtained by sowing flax on 25 Oct. at plant density of 1125 seeds/m^2 with an average of 1.31 and 1.59g , respectively, while the lowest mean values were obtained when planting flax on 5 Dec., combined with 1875 seeds / m^2 with averages of 1.05 and 1.21 g in the two successive seasons , respectively .

The second order interaction indicated that the maximum seed yield / plant was 1.82 and 2.21g in the first and second seasons, respectively which was recorded with Giza8, sown on Oct.25 and seeded at 1125 seeds / m^2. On the other hand, the minimum seed yield was 1.26 and 1.45 g in 1995 / 96 and 1996 / 97 seasons, respectively, which was obtained by Iriana, sown on Dec.5 and seeded at 1875 seeds / m^2.

5- Seed index (g) :

Mean values of seed index as affected by sowing date and plant density of the two flax varieties in the two successive seasons 1995 / 1996 and 1996 / 1997 are presented in Table (12).

Statistical analysis indicated significant differences between the two flax varieties i.e, Giza8 and Iriana as well as due to sowing date and plant density treatments in both seasons. .

For flax varieties, results revealed that the local variety Giza8 achieved a greater seed index and surpassed Iriana in both seasons. The mean values of this character for Giza8 were 8.25 and 8.62 g when compared with the lower mean values by Iriana which recorded 5.73 and 5.80 g in the two successive seasons, respectively. The present results agreed with those obtained by Kumar and Singh (1967), Remussi et al (1967), Momtaz et al (1980), Salama (1983), El-Kady (1985), El-Kady et al (1988), Salama (1988), Sorour et al (1988), Hella et al (1989), Momtaz et al (1989), El-Sweify (1993), Moawed (1996), and Abou Zaied (1997).

Concerning sowing dates effect, results showed a gradual reduction in seed index with delaying sowing date from 25 Oct. to 5 Dec. The estimates obtained were 7.33, 6.93 and 6.71 g in the first season and 7.45, 7.22 and 6.96 g in the second season for the three sowing dates 25 Oct., 15 Nov. and 5 Dec., respectively. The reduction in seed index due to delaying sowing date is mainly due to the reduced vegetative growth period which leads to a decrease in dry matter accumulation. Similar results were also reported by El-Nakhlawy et al (1978), El-Farouk et al (1980), El-Haroun et al (1982), Kwon et al

Table(12): Mean values of seed index (g) as affected by sowing dates and plant density of the ... varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96				1996/97			
		Plant density			Mean	Plant density			Mean
		1125	1500	1875		1125	1500	1875	
Giza 8	25 Oct.	8.39	8.39	8.35	8.37	8.87	8.75	8.31	8.64
	15 Nov.	8.29	8.27	8.27	8.28	8.86	8.72	8.29	8.62
	5 Dec.	8.14	8.12	8.10	8.12	8.85	8.66	8.28	8.59
Mean		8.27	8.25	8.24	8.25	8.86	8.71	8.29	8.62
Iriana	25 Oct.	6.40	6.28	6.19	6.29	6.37	6.27	6.11	6.25
	15 Nov.	5.95	5.81	5.04	5.60	5.94	5.87	5.67	5.83
	5 Dec.	5.46	5.32	5.14	5.31	5.47	5.33	5.16	5.32
Mean		5.94	5.80	5.45	5.73	5.93	5.82	5.65	5.80
Overall mean	25 Oct.	7.39	7.33	7.27	7.33	7.62	7.51	7.21	7.45
	15 Nov.	7.12	7.04	6.65	6.93	7.40	7.24	6.98	7.22
	5 Dec.	6.80	6.72	6.62	6.71	7.16	6.99	6.72	6.96
Mean		7.10	7.03	6.84	6.99	7.39	7.24	6.97	7.21

L.S.D. 0.05	1995/96	1996/97
A (Varities)	0.0820	0.0730
B (Sowing date)	0.0158	0.0367
C (Density)	0.0183	0.0425
A x B	0.1248	0.7675
A x C	0.0629	0.0824
B x C	0.0283	Ns
A x B x C	Ns	Ns

(1988), Abou Zaied (1991), Samui and Bondopadhyay (1992) and Moawed (1996) .

Results showed also that seed index decreased with the increase in plant density from 1125 to 2250 seeds/m^2. The mean values obtained were 7.10 , 7.03 and 6.84 g in the first season, corresponding to 7.39, 7.24 and 6.97 g in the second season for the plant density of 1125, 1500 and 1875 seeds/m2, respectively. The reduction in seed index due to the increase in population density is a result of the increase in the competition among growing plants for light, water and nutrients. Similar results were also reported by Horodyski and Sokolowski (1964), El-Farouk (1968), Gad and El-Farouk (1978), El-Farouk et al (1980), Zahran et al (1984), Salama (1988), El-Shimy et al (1993), El-Sweify (1993), Moawed (1996), and Amany El-Refaie (1996).

Variety × sowing date and variety × density interactions in both seasons in addition to sowing date × density in the first season had significant effect on seed index . On the other hand, the second order interaction had no significant effect on seed index in both seasons .

Results showed that the highest mean values of seed index for Giza8 variety were recorded by sowing on 25 Oct. combined with the lowest plant density of 1125 seeds /m^2 which recorded 8.39 and 8.87 g but the lowest mean values were obtained by sowing on 5 Dec. at 1875 seeds/m^2 with averages of 8.10 and 8.28 g in the first and second seasons, respectively. For Iriana variety, the highest mean values of seed index were obtained by sowing on 25 Oct. with plant density of 1125 seeds/m^2 with averages of 6.40 and 6.37 g, but the lowest mean values were obtained when planting on 5 Dec., combined with 1875

seeds/m^2 with averages of 5.04 and 5.16 g in the two successive seasons, respectively.

The previous results indicated that sowing on 25 Oct. (the earliest date) combined with the lowest plant density caused an increment in seed index in both seasons. Meanwhile , the latest sowing date combined with the highest plant density caused opposite trend.

6- Seed yield / faddan (kg) :

Mean values of seed yield / fad as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995 / 1996 and 1996 /1997 are presented in Table (13) .

Analysis of variance indicated significant differences between the two flax varieties Giza8 and Iriana as well as due to sowing date and plant density treatments in both seasons.

Regarding flax varieties, results revealed that Giza8 variety was superior over Iriana in relation to seed yield / fad in both seasons. The mean values obtained by Giza8 were 589.77 and 677.07 kg / fad while the imported Iriana recorded 485.40 and 560.88 kg in the two successive seasons, respectively .

The present results indicated the superiority of Giza8 in seed yield over Iriana . The previous results showed that Giza8 was superior in number of capsules / plant , number of seeds / capsules , seed yield / plant and seed index , consequently a higher seed yield / fad is excepted . The present results agree with those obtained by El-Kalla and El-Kassaby (1982) , El-Kady et al (1988),

Table(13): Mean values of seed yield/fad (kg) as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995/96 and 1996/97

Varieties	Sowing dates	1995/96 Plant density 1125	1500	1875	1995/96 Mean	1996/97 Plant density 1125	1500	1875	1996/97 Mean
Giza 8	25 Oct.	586.50	617.23	639.45	614.39	663.50	709.70	735.38	702.86
	15 Nov.	546.90	587.50	623.93	586.11	628.90	675.57	717.45	673.97
	5 Dec.	512.55	584.28	609.68	568.83	589.95	672.05	701.10	654.37
Mean		548.65	596.33	624.35	589.77	627.45	685.77	717.97	677.07
Iriana	25 Oct.	493.85	506.18	523.18	507.73	568.00	582.15	601.63	583.93
	15 Nov.	477.80	494.35	496.60	489.58	549.47	568.52	571.10	563.03
	5 Dec.	448.33	470.35	457.98	458.88	519.35	540.92	546.80	535.69
Mean		473.33	490.29	492.58	485.40	545.61	563.86	573.18	560.88
Overall mean	25 Oct.	540.17	561.70	581.31	561.06	615.75	645.92	668.47	643.38
	15 Nov.	512.35	540.92	560.26	537.84	589.18	622.04	644.27	618.49
	5 Dec.	480.44	527.31	533.83	513.86	554.65	606.48	623.95	595.02
Mean		510.98	543.31	558.46	537.58	586.53	624.81	645.56	619.16

L.S.D. 0.05	1995/96	1996/97
A (Varities)	10.4760	15.4940
B (Sowing date)	6.5602	7.4239
C (Density)	7.1264	7.1798
A x B	Ns	Ns
A x C	12.9455	15.6100
B x C	Ns	Ns
A x B x C	17.4560	17.5870

Salama (1988), Sorour et al (1988), Hella et al (1989), Momtaz et al (1989), Kineber (1991), El-Shimy et al (1993), El-Sweify (1993), Sharief (1993), Samui et al (1995), El-Sweify (1996), Abou Zaied (1997) and El-Shimy et al (1997) .

Concerning sowing date effects, results showed a gradual decrement in seed yield / fad with delaying sowing date from 25 Oct. to 5 Dec. Seed yield per plant decreased from 561.06 to 513.86 kg / fad in the first season, and from 643.38 to 595.02 kg / fad in the second one as sowing date was delayed from Oct.25 to Dec. 5 .

The present results revealed that delaying sowing date after Oct.25 caused a remarkable reduction in seed yield per faddan, due to a reduction in the vegetative growth period . These findings are confirmed with those obtained by Mothur et al (1984), Sharma and Roy (1987), Kowen et al (1988), Samui and Bondopadhyay (1992) and Warma and Pothak (1993).

The results revealed that there was a gradual increase in seed yield per faddan when plant density increased from 1125 to 1875 seeds /m^2 with the mean values of 510.98, 543.31 and 558.46 kg / fad. for the plant densities of 1125, 1500 and 1875 seeds /m^2 in the first season, respectively, corresponding to 586.53, 624.81 and 645.56 kg / fad in the second season. In spite of the decrease in seed yield per plant (g) with increasing plant density per unit area, but an opposite trend had happened in seed yield / faddan due to the greater number of flax plants per unit area with increasing plant density which compensates the reduction in seed yield / plant. Similar results were reported by Mokhtar (1965), El-Farouk (1968), El-Nakhlawy (1975),

El-Nakhlawy et al (1978), Vasilica and Vasilica (1979), Momtaz et al (1980), Zahran et al (1984), El-Shimy et al (1985), Hella et al (1986), Hassan and El-Farouk (1987), Salama (1983), Kwon et al (1988), Subotinas (1991), Bassi and Badiyala (1992), Nada (1995) and Amany El-Refaie (1996) .

The interaction between variety and densities as well as the second order interaction had significant effect on seed yield / fad, but variety × sowing date as well as sowing date × density had insignificant effect in both seasons. It could be concluded that the highest mean values of this character were obtained by Giza8 variety when flax was sown on 25 Oct., combined with the highest plant density of 1875 seeds /m^2 with the mean values of 639.45 and 735.38 kg / fad in the first and second seasons, respectively. On the other hand, the lowest mean values were obtained by sowing flax on 5 Dec. at 1125 seeds /m^2 with the averages of 512.55 and 589.95 kg / fad in the two successive seasons, respectively. Iriana variety yielded its maximum mean values (523.18 and 601.63 kg seeds faddan) by sowing flax on 25 Oct. at plant density of 1875 seeds /m^2, but the lowest mean values were obtained when planting flax on 5 Dec. combined with 1125 seeds/fad with averages of 448.33 and 519.35 kg/fad in the two successive seasons, respectively.

The second order interaction indicated that the maximum seed yield / fad was 639.45 and 735.38 kg in the first and second seasons, respectively which was recorded by Giza8, sown on Oct.25 and seeded at 1875 seeds /m^2.

On the other hand, the minimum seed yield / fad was obtained by Iriana sown on Dec.5 at 1125 seeds / m^2, being 448.33 and 519.35 kg in 1995 / 1996 and 1996 / 1997 seasons, respectively.

Generally, it can be concluded that there are significant differences between the two flax varieties, Giza8 and Iriana in all seed characters studied in both seasons except with number of capsules / plant and apical branching zone length in the second season where the differences did not reach the level of significant. The local flax variety Giza8 was superior to the imported Iriana in all seed yield and its components i.e., number of capsules / plant, number of seeds / capsule, apical branching zone length seed index and seed yield / plant as well as per faddan.

There are considerable reductions in all seed characters previously mentioned as affected by delaying sowing date. In addition the three sowing dates (25 Oct., 15 Nov. and 5 Dec) significantly differed in their effect on seed traits in both seasons except with the apical branching zone length which was not significantly affected in the second season .

Concerning plant density effect, most of seed characters under study were significantly affected by the three plant densities i.e, 1125,1500 and 1875 seeds /m^2, except with the apical branching zone length which was not significantly affected in the second season Moreover, the mean values of these characters decreased with increasing plant density towards the highest seed rate. On the other hand, seed yield / faddan was increased with increasing plant density .

III. Technological Characters :

1 - Fiber length (cm):

Mean values of fiber length as affected by sowing dates and plant density of the two flax varieties in the two successive seasons 1995 / 1996 and 1996 / 1997 are presented in Table (14) .

Analysis of variance indicated significant differences between the two flax varieties i.e, Giza8 and Iriana as well as due to sowing date and plant density treatments in both seasons .

Regarding flax varieties, results revealed that Iriana was superior over Giza8 in fiber length character in both seasons. The mean values obtained by Iriana were 73.83 and 86.94 cm compared with the shorter mean values obtained by Giza8 which recorded 60.78 and 71.56 cm in the two successive seasons, respectively. These results indicated that Iriana is superior as fiber flax variety. The results agree with those obtained by Salama (1983), Hella et al (1986), El-Kady et al (1988), Salama (1988), El-Gazzar (1990), Kineber (1991), El-Sweify (1993), El- Sweify and Mostafa (1996), Moawed (1996), Abou Zaied (1997) and El-Shimy et al (1997) .

Concerning sowing dates effect, fiber length was decreased from 69.97 to 64.61 cm in the first season and from 81.66 to 76.03 cm in the second one when sowing was delayed from Oct.25 to Dec.5, respectively. It is clear that delaying sowing date after Oct.25 caused a remarkable reduction in fiber length. This result is due to the good effects of a longer growth period on fiber formation. Similar results were obtained by El- Farouk et al (1980), Samia Hassan and El-Farouk