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EFFECT OF THINNING TIME, NITROGEN APPLICATION AND SOWING DATES ON SESAME YIELD UNDER MIDDLE EGYPT CONDITIONS

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Abstract

Two field experiments were conducted at Mallawi Agricultural Research Station during 1995 and 1996 seasons to study the effect of sowing dates (s1 and s2), thinning time, (T1 and T2) and time of nitrogen application (N1, N2, N3 and N4 on yield and yield commponts)of seasme. A split-split plot design was used. It was concluded from results that a higher growth measurements of plant height, low stem height to the first capsule, higher fruiting zone, number of capsule per plant, seed weight per plant, 1000 seed weight, seed yield per feddan, and oil percent recorded from early sowing (mid April), thinned plants after 20 days from sowing, and applied on third of nitrogen at sowing, another third at thinning and the last third at the beginning of flowering. The interaction between sowing dates and thinning time had significant effect on plant height, fruiting zone length, and seed yield per feddan in both seasons in addition to first capsule height and seed yield per plant in the first and second season respectively. The highest values were obtained by sowing in mid April with thinned plants after 20 days from sowing. The interaction between sowing dates and nitrogen application was significant for the first capsule height and seed yield per feddan in both seasons in addition to 1000 seed weight and seed yield per plant in the first and second seasons respectively. While the interaction between thinning time and time of nitrogen application had significant effect on the first capsule height and seed yield per plant in the first and second seasons respectively. Seed yield per feddan strongly correlated with different yield components attributes to different correlation coefficient levels.

INTRODUCTION

Sesame (*Sesamum indicum* L.) may be the oldest cultivated oil crops. Sesame is a rich source of oil and protein contents. Its seeds contain more than 50% of an excellent edible oil. In Egypt, the oil production met only about 30% of local oil consumption. Recently, to excess such gap, oil crops such as seasme has

attracted special attention. Therefore, it is of great importance to increase total production of seasme seeds. This could be achieved by increasing the cultivated area using high yielding varieties and /or improving the agronomic practices. The recommended sowing date thinning time and nitrogen application might vary to avoid the over crowding of the seedlings in the hills and provide sesame plants with its requirements of nitrogen at the proper time. Osman and Khidir (1974), concluded that in early sowing a positive correlation was found between plant height, number of capsules per plant, seed weight per both plant and per feddan. Abd-El-Rahman et al. (1980) reported that 15 th April sowing date gave the highest seed yield per feddan as compared with 5th May and 25th May sowing dates. Eid et al. (1986) concluded that sowing sesame on May 12th gave the highest number of capsules per plant, seed yield per both plant and feedan than June 2nd and June 23rd sowing dates. Mulkey et al. (1987) reported that delaying sowing date from 27th April to 15th May reduced mature seeds per plant from 61 to 54% Chimanshetter and Dhoble (1992) concluded that mean seed yield decreased from 0.57 ton per hectar with the earliest sowing date to 0.12 ton per hectar with the late sowing date. Tiwari et al. (1994) found that yield averaged 3.99, 1.85, and 1.75 ton per hectar when sown at July 1st, 10th and 20th.

As time of thinning, Gonqales and Velasquez (1987) studied the effect of thinned sesame plant at different stages when plants were 4, 6, 8, and 10 inches tall or was grown without thinning. The highest seed yield was obtained when thinning was done at 4-6 inches, delay in thinning significantly reduced final plant height and height of the first capsule.

As time of nitrogen application, Gaur and Trehan (1973) stated that the highest sesame seed yield was obtained with 30 kilograms of nitrogen per hectar, applied at two equivalent parts, the first half at sowing and and the second one at one month after sowing. Pineda and Velasquez (1987) found that the highest seed yield of sesame plants were obtained by adding 0, 50, and 100 unit of Nitrogen per hectar of which of which 50% was applied at sowing, and 50% at 45 days later. Auwalu et al. (1995) concluded that, split application of nitrogen increased seed yield significantly than single application.

Therefore, the goal of this investtigation was to determine optimal time of thinning and nitrogen application in early and late sowing of sesame.

MATERIALS AND METHODS

Two field experiments were conducted at Mallawi Agricultural Research Station during 1995 and 1996 seasons to study the effect of sowing dates, the thinning time and time of nitrogen application on yield and yield components and also on seed oil content of sesame. A split plot design with four replicates was used. Sesame cultivar namely Giza 32, a local unbranched variety was used during both seasons of this study.

A: Main plots (Sowing dates)

1- Early sowing (mid April)

2- Late Sowing (late May)

B: Sub plot (Thinning time)

1- Thinning time after 20 days from sowing.

2 - Thinning time after 30 days from sowing.

C: Sub Sub plots (Time of Nitrogen application)

1. 1/3 of nitrogen dose at sowing time and 2/3 at thinning.
2. 1/3 dose at sowing, 1/3 at thinning and 1/3 at the beggining of flowering.
3. 1/2 at thinning and 1/2 at the beggining of flowering.
4. All dose of nitrogen at the thinning time.

Each experiment unit consisted of 6 ridge, 50 cm. width and 4 m length. The seeds of sesame 4.0 Kg/fed. were sown in hills in 10 cm. appart on 16 th April, 25th May in 1995and 15 th April and 30th May in 1996 seasons. The plants were thinned on two plants per hill. Phosphoras fetilizer at the rate of 15 kilogram P2O5 per feddan potassium sulphate were added during land preparation and before ridging. Nitrogen fertilizer at the rate of 30 kg/N per feddan (in the form of Urea 46% N) was added according to the treatments under study. Chemical analysis of the experimental farm in both growing seasons is shown in table (1).

Table 1. Chemical analysis of the experimental farm in 1995 and 1996 seasons.

Characters	pH	pH	pH	Available ppm		
				N	P	K
1995	8.2	8.2	8.2	60	15	202
1996	8.1	8.1	8.1	72	23	204

The normal cultural practices of growing seasme plants were followed planting to harvesting. At harvest time, ten plants from each sub-sub plots were chosen randomly to estimate the following plant height, first capsule height, number of capsules per plant, 1000 seed weight and seed yield per plant, while seed yield per feddan was estimated by using the central 3 ridges. Seed oil percentage was determined on dry weight basis according to the method described by A.O.A.C. (1980). All data in each season were statistically analyzed according to Steel and Torrie, 1980.

RESULTS AND DISCUSSION

1- Effect of sowing dates:-

Data presented in Table (2) show the effect of sowing dates of seasme during the two growing seasons. A higher growth measurements of plant height, low stem height to the first capsule, higher fruiting zone, number of capsules per plant, seed weight per plant, 1000 seed weight and oil content recorded from early sowing date (mid April) comparing to the respective characters observed from late sowing date (late May),as result of the correlation between seed yield Kg/fed and the respective plant characters. These results may be due to the increase of vegetative growth period of early sowing which in turn gave higher dry matter production, taller plants, maximum leaf number and leaf area per plant and capsule number per plant compared to late sowing date. The effect of vegetative growth period may affect the current of photothynthesis and dry matter. These result are in aggreement with those obtained by Osman and Khidir (1974), Abd-El-Rahman et al. (1980), Eid et al. (1986), Saha et al. (1993), Tiwari et al. (1994) and Jadhao et al. (1994).

2. Effect of thinning time:

Thinning time had clearly decisive effect on sesame seed yield and its components. Data presented in Table (2) show that all characters under study were significantly affected by thinning time. Thinning sesame seedling after 20 days led to a significant increase of most studied characters, and decrease of the stem height to the first capsule compared to thinning sesame seedlings after 30 days.

Furthermore, seed oil content did not significantly differ in the two thinning times. These results may be due to the benefit gained from early thinning which reflected in decreasing the comptition between sesame plants in early growth stage. These results are in agreement with Gonzalez and Velasquez (1987).

Table 2. Effect of sowing date, thinning time and time of nitrogen application on some sesame plant characters in 1995 and 1996 seasons.

Characters	Plant height (cm)		1st capsule height cm		fruiting zone cm		No.of capsules/plant		Seed yield kg/plant		1000 seed weight (g)		seed yield kg/fed.		Oil Percntage	
Treatments	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
Sowing date:																
S1-Early sowing (mid April)	205.3	197.5	51.6	58.4	153.8	197.5	78.13	70.3	9.2	8.2	3.51	3.46	651.5	623.5	57.6	57.72
S2- Late sowing (late May)	172.9	165.2	62.6	63.0	110.3	165.2	59.7	49.08	6.9	6.7	3.17	3.22	508.5	494.8	56.95	57.08
Significance	N.S.	*	**	**	*	*	*	**	**	*	**	N.S.	**	*	*	*
Thining time: (Days after sowing)																
T1-20 days	198.7	188.3	54.1	59.3	144.5	188.3	75.4	64.96	8.6	7.9	3.41	3.45	592.8	570.13	57.3	57.62
T2-30 days	179.6	174.4	60.1	62.13	119.5	174.4	62.4	54.4	7.5	6.99	3.27	3.23	567.3	548.3	57.27	57.18
Significane	**	**	**	**	**	**	**	*	**	**	*	N.S.	*	**	N.S.	N.S.
Time of N.application	203.6	191.7	94.7	53.9	153.9	191.7	73.5	58.3	8.4	7.8	3.32	3.36	602.2	585.0	57.24	57.24
N1:1/3 at Sowins+2/3 at Thinning	197.9	190.3	50.2	55.1	147.8	190.3	79.4	59.5	8.8	8.4	3.49	3.46	613.7	596.7	57.26	57.26
N2: 1/3 at Thinning + 1/2 at 1st flowering	179.5	178.1	61.2	63.9	118.3	178.1	67.0	64.2	8.05	7.3	3.40	3.33	589.7	560.2	57.27	57.27
N4: all at Thinning	175.6	165.4	67.4	69.8	108.3	165.4	55.7	46.8	6.96	6.2	3.15	3.20	514.5	494.9	57.37	57.37
L.S.D. 5%	9.2	8.0	1.8	1.4	9.3	8.0	7.9	7.9	0.56	0.46	0.16	0.17	26.99	28.14	N.S.	N.S.
Interaction:																
S x T	*	*	**		*	*	N.S.	N.S.	N.S.	**	N.S.	N.S.	**	**	N.S.	N.S.
S X N	N.S.	N.S.	**		N.S.	N.S.	N.S.	N.S.	N.S.	**	**	N.S.	**	**	N.S.	N.S.
T X N	N.S.	N.S.	N.S.		N.S.	N.S.	N.S.	N.S.	N.S.	**	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

3. Effect of time of nitrogen application:

Time of nitrogen application sh owed significant effect on all characters under study Table (2). However, the highest value of plant height, low stem height to the first capsule and higher fruiting zone were obtained from applying third dose of nitrogen at sowing time and the rest at thinning time in both seasons in addation to oil% in the second seasons. The highest number of capsules per plant, 1000 seed weight and seed yield per plant or feddan resulted by applying one third of nitrogen at sowing time, one third at thinning and the last third at the beginning of flowering while the lowest values were obtained from applying all quantity of nitrogen at thinning time in both seasons. No singnificant differences were found in seed oil content in the first season. Many investigators Gaur and Trehan (1973), Pineda and Velasquez (1987) and Auwalu et al. (1995) obtained the same results.

4. Effect of interactions

Data in Table (3) show that plant height, fruiting zone length and seed yield kg. per feddan in both seasons in addition to the first capsule length and seed yield per plant in the first and second season respectively, were significantly affected by the interaction between sowing dates and thinning time. The highest value of plant height, low of the first capsule, higher fruiting zone and highest of seed yield per plant or feedan were obtained by sowing sesame in early sowing date (Mid April) with tthinning plants after 20 days of sowing. While the lowest values were obtained from planting sesame at late May with thinning plants after 30 days of sowing. This might be due to the longer period of the comptition between the crowded plants in a very limited area of the hill on nutrients moisture and high as a result of delaying thinning up to 30 days after sowing, which in turn restricted the capacity of sesame plants to bear more capsules.

Table 3. Interaction effect between sowing dates and thinning time on some esame characters.

Sowing date	Thinning Time D.S.A.*	plant heigh (cm) 1995	plant heigh (cm) 1996	first capsule height (cm) 1995	fruiting zone length 1995	fruiting zone length 1996	Seed yield/plant (g) 1996	Seed yield/fedan (kg) 1995	Seed yield/fedan (kg) 1996
S1-Early	T1-20 days	217.8	199.8	47.92	169.8	142.8	8.94	663.8	633.9
sowing	T2-30 days	179.6	177.3	55.25	137.7	135.5	7.41	639.1	613.2
S2-Late	T1-20 days	192.9	195.8	60.33	119.3	115.4	6.86	521.7	506.3
sowing	T2-30 days	166.3	153.0	64.92	101.4	88.17	6.58	495.4	483.3
L.S.D	5%	35.26	21.98	2.94	37.09	22.22	0.98	23.98	29.44

* D.A.S. = Days after sowing

Table 4. Interaction effect between sowing dates and time of nitrogen application on some sesame characters.

Sowing date	Time of N. application	First capsule height cm		seed yield/ plant (g)	1000 seed weight (g)	Seed yield (kg)/fed.	
		1995	1996	1996	1995	1995	1996
S1-Early sowing	N1: 1/3 at sowing + 2/3 at Thinning	44.47	52.50	8.21	3.50	659.0	635.8
	N2: 1/3 at Sowing+1/3 at Thinning+1/3 at 1st flowering	46.00	54.00	9.04	3.55	700.2	683.3
	N3: 1/2 at Thinning + 1/2 at 1st flowering	55.20	61.70	8.17	3.65	676.0	630.8
	N4: all at Thinning	60.50	65.50	7.27	3.33	570.7	544.2
S2-Late sowing	N1: 1/3 at sowing + 2/3 at Thinning	54.70	55.30	7.47	3.47	545.3	534.2
	N2: 1/3 at Sowing+1/3 at Thinning+1/3 at 1st flowerlng	54.30	56.20	7.82	3.09	527.2	510.0
	N3: 1/2 at Thinning + 1/2 at 1st flowering	67.20	66.20	6.37	3.15	503.3	489.5
	N4: all at Thinning	74.30	74.20	5.22	2.98	458.3	445.7
L.S.D 5%		4.60	2.42	1.49	0.195	109.3	279.9

Date in Table (4) indicate that the interaction effect between sowing dates and nitrogen application was significantly different for the first capsule height and seed yield kg. per feddan in both seasons in addition to 1000 seed weight and seed yield per plant in the mid April (Early sowing) and applying nitrogen fertilizer in three equal doses at sowing at thinning time and at the begining of flowering. The reverse was true with regard to sowing date at late of May and applying all nitrogen dose at thinning time. The significant interaction effect indicated that time of both sowing dates and nitrogen application acted dependently on sesame plant characters.

The effect of thinning time and time of nitrogen application interaction Table (5). Showed that thinning sesame plants after 20 days of sowing and applying one third dose of nitrogen fertilizer at sowing time and two third at the thinning time gave the best values of first capsule height and seed yield per plant in the first and the second season respectively. The revese was true with regard to late thinning time and adding all nitrogen dose at thinning time.

Table 5. Interaction effect between thinning time and time on nitrogen application on some sesame characters.

Thinning time D.A.S.	Time of N. application	First capsule height cm	seed yield/ plant (g)
		1995	1995
T1-20 days	N1: 1/3 at sowing + 2/3 at Thinning	52.00	8.65
	N2: 1/3 at Sowing+1/3 at Thinning+1/3 at 1st flowering	54.67	8.64
	N3: 1/2 at Thinning + 1/2 at 1st flowering	63.17	7.73
	N4: all at Thinning	67.17	6.66
T2-30 days	N1: 1/3 at sowing + 2/3 at Thinning	55.83	7.03
	N2: 1/3 at Sowing+1/3 at Thinning+1/3 at 1st flowering	55.50	8.32
	N3: 1/2 at Thinning + 1/2 at 1st flowering	64.67	6.81
	N4: all at Thinning	72.50	5.83
L.S.D. 5%		2.06	0.75

5. Correlation coefficient and interrelationship between yield and yield components:

Correlation coefficient among sesame seed yield and some yield components

were shown in Table (6). Seed yield showed positive and highly significant relationship with plant height, fruiting zone length, seed yield per plant and 1000-seed weight in both growing saesons. While number of capsules per plant recorded positive and highly significant in the second season only.

These results indicate that seed yield per feddan correlated significantly and positively with different yield components attributees with different corelation coefficient levels. These results are in accordence with those reported by other workers Ramachandran et al. (1972), Osman and Kidir (1974) and Le and Zhang (1993).

Finally, the results of this study confirm the importance of thinning sesame plants 20 days after sowing, and applied nitrogen fertilizer in three equal doses at sowing time, at thinning, and at the beginning of flowering when the cultivar Giza 32 was planted at early sowing time in April. On the other hand, the results could be considered optimal for late sowing at the end of May by thinning plants 20 days after sowing and applied third dose of nitrogen at sowing and the rest at thinning time.

Table 6. Correlation coefficients between yield and its components of sesame in 1995 and 1996 seasons.

Year \ Character	1 plant height	2 1st capsule height	3 fruiting zone	4 No. of /plant	5 seed weight/ plant	6 1000 seed weight	7 seed yield/feddan
1 1st		-0.87**	0.89**	0.51	0.77*	0.69	0.88**
2 nd		-0.89**	0.97**	0.79*	0.93**	0.89**	0.83**
2 1st			-0.97**	-0.72*	-0.83**	-0.78*	0.85**
2 nd			-0.91**	-0.67	-0.89**	0.75*	0.69
3 1st				0.64	0.87**	0.78*	0.88**
2 nd				0.86**	0.67	0.92**	0.86**
4 1st					0.66	0.70*	0.60
2 nd					0.92**	0.94**	0.85**
5 1st						0.98**	0.94**
2 nd						0.96**	0.86**
6 1st							0.91**
2 nd							0.91**
7 1st							
2 nd							

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تأثير ميعاد الخف والسماد الازوتى وميعاد الزراعة على محصول السمسم تحت ظروف مصر الوسطى

سمير طه السروجى

معهد بحوث المحاصيل الحقليه – مركز البحوث الزراعية .

أجريت تجربة حقلية بمحطة البحوث الزراعية بملوى (محافظة المنيا) موسمى ١٩٩٥، ١٩٩٦ لتحديد الميعاد الامثل لخف بادرات السمسم وانسب ميعاد وطريقة توزيع السماد الازوتى فى الزراعات المبكرة (منتصف ابريل) والزراعات المتأخرة (نهاية مايو) لمحصول السمسم.

أوضحت نتائج الدراسة ما يلى :-

– أظهر الميعاد المبكر للزراعة (منتصف شهر ابريل) تفوقاً واضحا فى المحصول ومكوناته عن زراعة محصول السمسم متأخر (نهاية شهر مايو) أدى الخف المبكر لبادرات السمسم بعد ٢٠ يوم من الزراعة الى زيادة طول النبات وارتفاع المنطقة الثمرية وعدد الكبسولات ومحصول النبات ومحصول الفدان عن الخف المتأخر بعد ٣٠ يوم من الزراعة.

أظهر إضافة السماد الازوتى فى معظم الحالات تأثير معنوى على جميع الصفات تحت الدراسة وقد تحققت اعلى قيمة من أضافة السماد الازوتى على ثلاث دفعات الاولى عند الزراعة والثانية عند الخف والثالثة عند بداية التزهير.

أظهر التفاعل بين عوامل الدراسة ان خف البادرات فى الميعاد المبكر سواء على ٢٠ يوم أ ، ٣٠يوم من الزراعة مع اضافة السماد النتروجينى على ثلاث دفعات عند الزراعة والخف وبداية التزهير، بينما يفضل الخف فى الميعاد المتأخر بعد ٢٠ يوم من الزراعة مع اضافة السماد الازوتى على دفعتين ثلث الكمية عند الزراعة وثلثى الكمية عند الخف.