The Effect of Seeding Rate on Growth and Yield of 'Sidi Misri 1' Wheat (*Triticum aestivum* L.)

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ABSTRACT

The effect of seeding rate on the growth and yield of 'Sidi Misri 1' wheat was studied in two seasons; 1973 and 1974, at the Faculty of Agriculture Farm, Tripoli. Plant height and spike length were decreased by increasing the seeding rate in both growing seasons.

In the 1973 experiment, the maximum grain yield of 2.062 ton/ha was obtained with a seeding rate of 100 kg/ha, and the lowest yield, 1.587 ton/ha with a seeding rate of 60 kg/ha. In the second experiment of 1974, however, the maximum grain yield, 1.796 ton/ha resulted when the seeding rate was 75kg/ha and the lowest 1.328 ton/ha resulted with 30 kg/ha.

On plant basis, the average grain yield, number of grains, and number of tillers per plant decreased with increasing the seeding rate. On the other hand, straw yield, grain to straw ratio, and grain size were not significantly affected by seeding rate. It was concluded that the optimum rate of seeding ranged from 75 to 100 kg/ha.

INTRODUCTION

Seeding rate is one of the most important factors affecting the growth and yield of wheat (1,2,6,7). Grain yield and grain size in oats decreased with the decrease in seeding rate (5). Reduced stands in wheat produced lower yields due to the decrease in number of heads per unit area (7). The number of grain-bearing heads per plant decreased with the increase in seeding rate. Moreover, the greatest height and latest heading resulted from the lowest seeding rate (6). El-Jibouri (3) reported that the seeding rate practiced in Libya ranged from 100 to 200 kg/ha. Omar *et al.* (4) noted a trend towards increase in the grain yield and a decrease in the straw-yield of oats under thin planting. Plant height and panicle length increased with thin planting. Grain size was not affected by seeding rate. On the other hand, Abdel-Gawaad *et al.* (1) found that wheat plants tended to increase in height and decrease in tillering due to the increase in plant density. They

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observed significant increase in grain yield with the increase in plant density. The panicle length and 1,000-grain weight were not affected by the seeding rate.

The present study was conducted to investigate the effect of the seeding rate on wheat growth, yield, and yield components.

MATERIALS AND METHODS

Two field experiments were conducted during 1973 and 1974 using 'Sidi Misri 1' wheat cultivar at the Faculty of Agriculture Farm, Tripoli. A randomized complete block design with four replicates and five treatments in 1973 experiment and seven treatments in 1974 experiment was used as follows:

	Seeding rate (kg/ha) in:	
Treatment	1973	1974
1	60	30
2	80	45
3	100	60
4	120	75
5	140	90
6	—	105
7	—	120

Planting dates were December 9, 1973 and November 21, 1974 for the first and second experiment, respectively. Wheat grains were drilled in rows 30 cm apart in 4 × 4 m plots. Three hundred kg/ha of 12–24–12 fertilizer was applied in two equal amounts at planting and 28 days after planting. An additional amount of 300 kg/ha of superphosphate was added in the second experiment. Sprinkler irrigation was applied every 10–15 days according to plant need. Five plants were sampled at random from each plot at maturity for measuring plant height and recording yield components data. The whole plots were harvested on May 26, 1973 and May 15, 1974 in the first and second experiments, respectively. Grain yield, straw yield, and grain to straw ratio were determined. All data were subjected to the analysis of variance method.

RESULTS AND DISCUSSION

Plant height at harvest in general decreased with the increase in seeding rate in both years as shown in Tables 1 and 2. The data of Table 1 indicate that in the first season 1973, the maximum grain yield, (2.062 ton/ha) and the lowest (1.587 ton/ha) were obtained with seeding of 100 and 60 kg/ha, respectively. The difference between these two figures was significant, whereas no significant differences were obtained between the other seeding rates. On an individual plant basis, the average grain yield per plant decreased with an increase in the seeding rate. However, no significant differences were obtained except between the lowest and highest seeding rates, since they gave 2.21 and 1.21 g/plant, respectively. The average number of grains per plant was not significantly affected by the seeding rate, although a tendency towards a decrease in the number of grains per plant with an increase in the seeding rate can be noted. The average number of tillers per plant was decreased by increasing the seeding rate with significant difference between the highest and lowest seeding rates. On the other hand, average spike length and 1,000-grain weight were not significantly affected by seeding rate.

Table 1 Effect of seeding rate on plant height and yield components in 'Sidi Misri 1' wheat in 1973

Seeding rate kg/ha	Average plant height cm	Average grain yield ton/ha	Average grain yield per plant g	Average number of grains per plant	Average number of tillers per plant	Average spike length cm	Average 1,000-grain weight g
60	61.0	1.587	2.21	75	3.1	6.9	31.2
80	59.1	1.692	1.50	49	2.5	6.3	30.8
100	51.8	2.062	1.34	44	2.4	6.6	31.0
120	56.5	1.703	1.22	41	2.2	6.4	31.2
140	56.8	1.890	1.21	39	1.9	6.6	33.8
LSD(.05)	5.4	0.445	1.00	N.S	1.2	N.S	N.S

Table 2 Effect of seeding rate on plant height and yield components in 'Sidi Misri 1' wheat in 1974

Seeding rate kg/ha	Average plant height cm	Average grain yield ton/ha	Average weight of straw ton/ha	Grain to straw ratio %	Average grain yield per plant g	Average number of grains per plant	Average weight of grains per spike g	Average number of grains per spike	Average number of tillers per plant	Average spike length cm	Average 1,000-grain weight g
30	81.7	1.328	3.140	47.9	9.10	259.7	2.18	58.1	4.5	10.7	35.4
45	82.3	1.484	3.156	47.2	6.30	164.0	2.00	50.4	3.2	10.2	39.1
60	80.4	1.625	3.093	53.6	5.45	137.6	2.03	50.8	2.7	10.1	39.5
75	78.3	1.796	3.343	53.8	3.95	101.5	1.90	49.1	2.1	9.5	38.7
90	78.2	1.750	3.359	52.3	3.48	91.0	1.85	48.4	1.9	9.8	38.4
105	73.1	1.781	3.531	50.7	1.88	49.5	1.45	37.9	1.3	8.4	38.1
120	69.6	1.671	3.128	52.2	1.48	39.4	1.23	32.5	1.2	7.6	37.7
LSD (.05)	6.8	0.236	N.S	N.S.	0.44	38.4	0.47	8.3	0.49	0.3	N.S.

Table 2 summarizes the effect of seeding rate on plant height, yield and yield components in 1974. The maximum grain yield (1.796 ton/ha) and the lowest (1.328 ton/ha) resulted at seeding rates of 75 and 30 kg/ha, respectively. Significant differences in grain yield per hectare were also obtained between 30 and 60 and between 45 and 60 kg/ha. Straw yield, grain to straw ratio and 1,000-grain weight were not significantly affected by the rate of seeding. On an individual plant basis, the average weight and number of grains per plant and per spike, the average number of tillers per plant and spike length were generally decreased with an increase in the seeding rate. The differences in grain yield per plant were significant between the different treatments except between 105 and 120 kg/ha. On the other hand, no significant differences were obtained in the average weight of grains per spike between the different seeding rates up to 90 kg/ha. As for the number of grains per plant and per spike, significant differences were obtained between the lowest seeding rate and any other seeding rate.

The differences were also significant between the lowest seeding rate and any other treatment for the number of tillers per plant and spike length.

The results obtained are in close agreement with those obtained by Wilson and Swanson (7). They showed that the decrease in plant density caused a reduction in yield, but it increased tillering, plant height, and weight of spike. The increase in spike weight or number of spikes per plant could not compensate for the decrease in yield due to the reduction in plant density. It can be concluded that under conditions similar to these of the present experiments the optimum seeding rate ranged from 75 to 100 kg/ha.

LITERATURE CITED

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تأثير معدل التقاوي على محصول صنف القمح « سيدي المصرى/١ »

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المستخلص

أجريت دراسة تأثير معدل التقاوى في صنف القمح « سيدي المصرى/١ » بمزرعة كلية الزراعة ، جامعة طرابلس ، على النمو والمحصول في موسمي ١٩٧٣ ، ١٩٧٤ وأظهرت النتائج نقص ارتفاع النبات ونقص في طول السنبلة بزيادة معدل التقاوي في الموسمين . ولقد نتج أعلى محصول من الحبوب (٢,٠٦٢ طن / هكتار) في تجربة موسم ١٩٧٣ باستخدام معدل ١٠٠ كجم/هكتار من التقاوي وأقل محصول (١,٥٨٧ طن/هكتار) باستخدام ٦٠ كجم/ هكتار من التقاوى . وفي موسم ١٩٧٤ أعطى معدل ٧٥ كجم/ هكتار من التقاوي أعلى انتاج من الحبوب (١,٧٩٦ طن/هكتار) وأعطى معدل ٣٠ كجم/ هكتار من التقاوى أقل انتاج (١,٣٢٨ طن/هكتار) ولقد نقص متوسط محصول النبات من الحبوب كما نقص عدد الخلفات للنبات بزيادة معدل التقاوي ولم يتأثر وزن القش ونسبة الحبوب الى القش وكذا حجم الحبوب بمعدل التقاوي . تراوح أنسب معدل تقاوي تحت ظروف التجربة بين ٧٥ و١٠٠ كجم للهكتار .