The effect of Cycocel and Nitrogen Level on the Growth and Yield of 'Sidi Misri 1' Dwarf Wheat (*Triticum aestivum* L.)

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ABSTRACT

The effect of cycocel and nitrogen level on growth, yield, and yield components of 'Sidi Misri 1' wheat was studied in a field experiment in the 1973–1974 season at the Faculty of Agriculture Farm, Tripoli.

Plant height was increased by increasing the nitrogen level and was decreased by spraying with cycocel.

Tillering was not significantly affected by either the nitrogen level or the cycocel treatment.

Spike length and peduncle length were increased with the increase in the nitrogen level. On the other hand, spike length was not significantly affected by cycocel treatment, but spike peduncle was decreased with the cycocel treatment.

Total dry yield of grain and straw, and straw yield were increased by increasing the nitrogen level, and were not affected by cycocel treatment. The percentage of grain to straw was increased by cycocel spray and was not affected by the nitrogen level.

Grain yield per hectare was increased with the increase in the nitrogen level and by spraying cycocel at the rate of 80 kgN/ha. On plant basis the grain weight per plant and per spike was increased with the increasing nitrogen level, but was not affected by cycocel.

The number of grains per plant and grain size were not significantly affected by either nitrogen or cycocel treatments.

INTRODUCTION

The amount of nitrogen fertilizer applied to wheat is not determined by the marginal utility from a nitrogen unit with respect to yield, but it is determined by the ability of the plant to withstand lodging when a higher rate of fertilizer is used. For this reason, sometimes a lower rate of fertilizer than the plant needs is used to prevent or decrease lodging. Dwarf and semi-dwarf wheat cultivars, therefore, may allow the use of higher rates of nitrogen fertilizer without a notable excess lodging. Sawhney (8) found that tillering and spike population were interrelated and were affected by nitrogen

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fertilization. Grain number and weight were also related to each other. He also reported that intermediate nitrogen rates produced heavier spikes than higher rates and that 'Sidi Misri 1' appeared to be the highest yielding cultivar under high rates of nitrogen. Fuehring (5) obtained an economic increase in the grain yield of a Mexican semi-dwarf wheat cultivar by nitrogen application of up to 300 kg/ha. The number of kernels per head and kernel weight were not significantly affected by nitrogen fertilization according to Black (1). He found that the number of heads per hectare accounted for 97% of the yield variance associated with fertilizer treatments.

Cycocel (CCC) has been reported to shorten wheat plant stems (2,6,7). Tall and short-straw wheats were found to be affected differently with CCC. El-Sharkawy *et al.* (3,4) have shown that the short straw wheat cultivar, 'Sidi Misri 1', was only slightly shortened by CCC treatment, but grain yield was greatly affected.

The present study was initiated to investigate the effect of spraying short straw wheat, 'Sidi Misri 1', with CCC under different levels of nitrogen fertilizer, on growth, yield and yield components.

MATERIALS AND METHODS

A field experiment was conducted in the 1973–1974 season at the Faculty of Agriculture Farm, Tripoli, to study the effect of nitrogen level and cycocel (CCC) on the growth and yield of 'Sidi Misri 1' wheat. A randomized block design with four replicates and eight treatments was used. The treatments consisted of two levels of CCC; namely 0.0 and 1.8 kg active ingredient/ha and four nitrogen fertilizer levels, viz.30, 60, 80, and 100 kgN/ha, respectively.

'Sidi Misri 1' wheat (*Triticum aestivum* L.) was drilled on November 11, 1973 at a rate of 80 kg/ha. The plot size was 4×4 m consisting of 13 rows, 30 cm apart. Nitrogen fertilizer treatments were applied as ammonium sulphate (20.5% N) in two equal amounts, at planting and 28 days after planting. Cycocel was sprayed when the plants were four weeks old (at the four-leaf stage). Sprinkler irrigation was applied to supplement rainfall whenever it was needed.

At maturity, five plants were sampled at random from each plot for the measurement of plant height and the determination of yield components. The whole plots were harvested on May 5, 1974, and the total yield, grain yield, straw yield, and grain to straw ratio were determined.

Data were statistically analyzed by the analysis of variance according to Snedecor (9).

RESULTS AND DISCUSSION

I. Plant growth

The data presented in Table 1 indicate that plant height was increased by increasing the nitrogen level and was decreased by spraying with cycocel. On the other hand, tillering was not significantly affected by either nitrogen or cycocel treatments. The maximum plant height (80.2 cm) and the minimum (52.9 cm) were obtained with the highest nitrogen level and no spraying with cycocel and with the lowest nitrogen level and spraying with cycocel, respectively. As to spike length, there was a decrease in length with the lowest nitrogen level regardless of cycocel treatment, whereas, at higher nitrogen levels spike length was comparable in both cycocel treated and control plants.

Table 1 Effect of cycocel and nitrogen level on plant height, number of tillers per plant, spike length, spike peduncle length, total dry weight, straw weight, and grain to straw ratio

Treatments		Plant height (cm)	Number of productive tillers per plant	Spike length (cm)	Spike peduncle length (cm)	Total dry yield ton/ha	Straw yield ton/ha	Grain to straw ratio %
Nitrogen level Kg N/ha	Cycocel							
30	Treated	52.9	1.50	5.6	21.2	3.280	2.046	60.9
	Untreated	64.5	1.50	6.5	27.0	3.781	2.500	51.6
60	Treated	65.4	1.60	8.6	25.4	5.077	3.406	50.8
	Untreated	72.8	1.45	8.4	27.0	4.656	3.125	49.4
80	Treated	69.9	1.70	9.3	26.5	6.552	4.209	57.8
	Untreated	76.6	1.60	8.9	27.6	6.321	4.343	47.8
100	Treated	69.3	1.95	8.8	25.1	6.640	4.250	58.3
	Untreated	80.2	1.75	9.4	28.8	6.936	4.593	51.7
LSD (0.05)		8.0	N.S.	1.8	2.4	1.743	1.450	4.8

Table 2 Effect of cycocel and nitrogen level on the yield and yield components

Treatments		Grain yield ton/ha	Grain yield per plant (g)	Number of grains per plant	Grain weight per spike (g)	Number of grains per plant	Weight of 1,000 grains (g)
Nitrogen level kgN/ha	Cycocel						
30	Treated	1.234	1.80	46.4	1.28	32.3	38.9
	Untreated	1.281	1.63	41.3	1.03	25.5	39.6
60	Treated	1.671	2.60	63.3	1.65	40.2	41.1
	Untreated	1.531	2.55	61.2	1.73	41.0	42.4
80	Treated	2.343	3.12	76.0	1.85	45.0	41.2
	Untreated	1.978	2.27	45.9	1.45	33.7	42.9
100	Treated	2.390	3.05	64.8	1.53	38.2	39.7
	Untreated	2.343	3.15	74.2	1.83	43.0	42.3
LSD (0.05)		0.332	1.70	N.S.	0.69	16.6	N.S.

The length of the spike peduncle showed no significant response to nitrogen levels in the control plants. However, there was a decrease in peduncle length at the lowest nitrogen level when cycocel was sprayed.

At any nitrogen level, data indicate a non significant difference in total yield (grain plus straw) between sprayed and untreated plants. However the highest yield, i.e. 6.936 ton/ha, was obtained with the addition of 100 kgN/ha, and the lowest i.e. 3.280 ton/ha with 30 kgN//ha. A low yield of straw resulted with the application of 30 or 60 kgN/ha whether the plants were treated or untreated with cycocel. At higher nitrogen levels, a high straw yield was obtained, but the difference was not significant between the CCC treatments. The maximum straw yield i.e. 4.593 ton/ha was obtained with 100 kgN//ha and the lowest i.e. 2.046 ton/ha with 30 kgN//ha.

In general the percentage of grain to straw was not significantly affected by nitrogen level, but it was decreased by cycocel spray. The differences were significant at all nitrogen levels with the exception of 60 kgN/ha.

II. Yield and Yield Components

Table 2 summarizes the effect of nitrogen level and cycocel treatment on the yield and yield components of wheat. The grain yield per hectare was increased by increasing the nitrogen level, but it was not affected by cycocel except at 80 kgN/ha, since it was significantly increased. The maximum grain yield per hectare (2.390 ton/ha) and the lowest (1.234 ton//ha) were obtained at 100 and 30 kgN/ha, respectively.

On individual plant basis, the grain weight per plant and per spike were increased by increasing the nitrogen, but they were not affected by cycocel. The number of grains per plant was not significantly affected by either nitrogen or cycocel treatments. However, the number of grains per spike was increased by the increase in nitrogen level up to 80 kg/ha, but it was not significantly affected by cycocel. The weight of 1,000 grains was not significantly influenced by the different treatments.

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تأثير السيكوسيل ومستوي السماد الآزوتي على نمو ومحصول ومكونات صنف القمح « سيدي المصري / ١ »

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المستخلص

درس تأثير السيكوسيل ومستوى السماد الأزوتي على النمـــو والمحصول ومكوناته في صنف القمح « سيدي المصري / ١ » بمزرعة كليـة الزراعة ، جامعة طرابلس ، في موســم ١٩٧٣ – ١٩٧٤ وأوضحت نتائج هذه الدراسة زيادة ارتفاع النباتات بزيادة معـدل التسميد الأزوتي ونقص ارتفاعها نتيجة للرش بالسيكوسيل .

لم يتأثر عدد الخلفات للنبات بمستوى السماد الأزوتي أو الرش بالسيكوسيل .

زاد كل من طول السنبلة وطول حامل السنبلة بزيادة معدل السماد الأزوتي . وبينما لم يتأثر طول السنبلة بمعاملة السيكوسيل فقد نقص طول حامل السنبلة بهذه المعاملة .

زاد المحصول الكلي من القش والحبوب وكذا محصول القش بمفرده بزيادة مستوى السماد الأزوتى بينما لم يظهر تأثير الرش بالسيكوسيل عليها .

زادت نسبة الحبـــوب للقش نتيجـــة للرش بالسيكوسـيل ولكنها لم تتأثر بمستوي السماد الأزوتي .

زاد محصول الهكتار من الحبوب بزيادة مستوى السماد الأزوتي والرش بالسيكوسيل تحت مستوى ٨٠ كجم أزوت للهكتار .

زاد وزن حبـــوب النبات والسنبلة بزيادة مستوي السماد الأزوتي ولكن لم يظهر تأثير للرش بالسيكوسيل .

لم يتأثر عـــدد الحبوب للنبات وكذا حجم الحبوب بأي من مستوى السماد الأزوتي أو معاملة الرش بالسيكوسيل .