Response of Growth and Yield of Short-Straw Wheat (*Triticum aestivum* L.) to Salinised Water and Cycocel (CCC).

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ABSTRACT

The influence of irrigation with salinised water, with and without CCC treatments, on growth and yield of the short-straw wheat variety 'Sidi El-Misri, was investigated under greenhouse conditions. Seedling emergence was delayed by increasing salinity. Plant height at early stage was also reduced. Cycocel application significantly reduced plant height.

No significant effects on grain yield and various yield components were observed due to CCC treatment. On the other hand, irrigation with up to 6,000 ppm salinised water increased grain yield per plant as well as other yield components. Straw yield was significantly reduced by salinity therefore resulting in higher grain to straw ratio. Wheat plants tolerated salinity level up to 6,000 ppm irrespective of CCC application.

INTRODUCTION

Cereal crops were reported to be responsive to treatment with the growth regulant cycocel (CCC) under various conditions (6,7,8). Wheat varieties with tall and short stems were found to be affected differently with CCC. El-Sharkawy *et al.* (4,5) showed that the short-straw wheat, variety Sidi El-Misri, was slightly shortened by CCC treatment. On the other hand, grain yield was greatly affected

Higher resistance to drought and soil salinity due to treatments with CCC has also been reported (1,2,7). However, El-Kobbia *et al.* (3) claimed that growth and yield of wheat plants were not affected by salinity level up to 20,000 ppm irrespective of CCC treatment. In light of these findings, the present study was initiated to investigate the response of short-straw wheat to salinity as well as cycocel application.

MATERIALS AND METHODS

Grains of the short-straw variety Sidi El-Misri (*Triticum aestivum* L) were sown on 4 December 1973 in standard pots with drainage facilities, placed in the greenhouse at the Faculty of Agriculture farm, Sidi El-Misri, Tripoli. The pots, 28 cm deep and 25 cm wide, were filled with dried and sieved soil of the same farm (69.7% sand, 19.2% silt,

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10.1 % clay, and 7.44 % $CaCO_3$). The initial salt content of soil was estimated and found to correspond with 0.45m mhos/cm for 1 : 1 soil extract.

The experiment consisted of two levels of CCC namely 0.0 and 1.2 kg a.i. CCC/ha and four salinity treatments in form of pure tap water, tap water with 2,000, 4,000, and 6,000 ppm of 1 : 1 $CaCl_2$ and NaCl. Each treatment consisted of one pot in four replications. Plants were thinned to 4 plants per pot. Ten gm/pot of the 12–24–12 fertilizer was added in two splits at 45 and 100 days after sowing. Cycocel was sprayed twice when the plants were 5 and 7 weeks old

From sowing to maturity, the pots were irrigated to field capacity with pure tap and salinised water whenever the tensiometer readings reach 25–30 centibar.

RESULTS AND DISCUSSION

Percentage emergence at weekly interval, as influenced by salinity is shown in Table 1. Significant reduction in seedling emergence one week after sowing was observed due to salinity treatments. However, 2 to 3 weeks later no significant differences in percentage emergence were found.

The effects of salinity level and CCC treatment on plant growth is shown in Fig. 1. Measurements of stem height at one and two weeks after CCC application and at harvest indicated significant reduction at all salinity levels (Table 2). On the other hand, irrigation with 6,000 ppm salinised water significantly decreased plant height at early stage of growth.

Data of yield and its components as affected by salinity and CCC are presented in Table 3. Cycocel treatment at all salinity levels did not significantly affect the total weight of plants, grain to straw ratio, number and weight of grains per plant, number of spikes per plant, number and weight of grains per spike. Only number of tillers per plant was increased due to CCC treatment. Conversely, CCC decreased both spike length and grain size.

Irrigation with salinised water, at all concentrations used, significantly reduced the total weight of plants, spike length and number of tillers; while grain to straw ratio, number and weight of grains per plant, number and weight of grains per spike and the

Table 1 Effect of salinity on percentage emergence of wheat seedlings.

	Weeks after sowing		
Salinity level	1	2	3
Control	61	81	80
2,000 ppm	39	78	77
4,000 ppm	46	82	78
6,000 ppm	46	75	75
L.S.D. 5%	8	N.S.	N.S.
L.S.D. 1%	11	N.S.	N.S.

N.S. (not significant)

Table 2 Plant height as affected by salinity level and cycocel (CCC) spray (cm).

Treatment		Weeks after CCC treatments		
Salinity level	Cycocel	1	2	at harvest
Tap water	untreated	45	54	65
Tap water	treated	38	43	55
2,000 ppm	untreated	44	51	68
2,000 ppm	treated	38	41	56
4,000 ppm	untreated	43	51	66
4,000 ppm	treated	37	41	57
6,000 ppm	untreated	39	46	66
6,000 ppm	treated	34	37	53
L.S.D. 5%		2.7	3.4	5.7
L.S.D. 1%		3.7	4.6	7.8

Table 3 Effect of salinity level and CCC treatment on yield and yield components of Sidi El-Misri wheat variety.

Treatment Salinity level	Cycocel	Total wt. of plants per pot (gm)[1]	grain to straw %	wt. of grains per plant (gm)	number of grains per plant	number of grains per plant	number of spikes per plant	wt. of grains per spike (gm)	number of grains per spike	length of spike (cm)	wt. of 1,000 grains (gm)
Tap water	Untreated	23.9	22.4	1.02	41	3.0	1.6	0.67	27	8.6	25.9
Tap water	treated	22.4	20.5	0.91	37	3.8	1.3	0.83	32	8.0	24.8
2,000 ppm	untreated	26.7	48.7	2.16	73	2.6	1.9	1.19	41	8.1	29.6
2,000 ppm	treated	23.2	46.2	1.80	84	2.9	1.9	1.01	45	7.7	23.5
4,000 ppm	untreated	26.8	39.9	1.77	60	2.1	1.6	1.01	34	7.9	29.5
4,000 ppm	treated	23.9	41.9	1.76	78	2.6	1.6	1.10	44	7.5	22.5
6,000 ppm	untreated	15.7	52.1	1.55	51	1.5	1.3	1.25	42	7.9	30.1
6,000 ppm	treated	17.9	55.6	1.56	52	1.8	1.4	1.11	45	6.4	30.4
L.S.D. 5%		5.3	8.2	0.20	18	0.5	0.5	0.42	18	0.7	6.8

[1]Four plants per pot

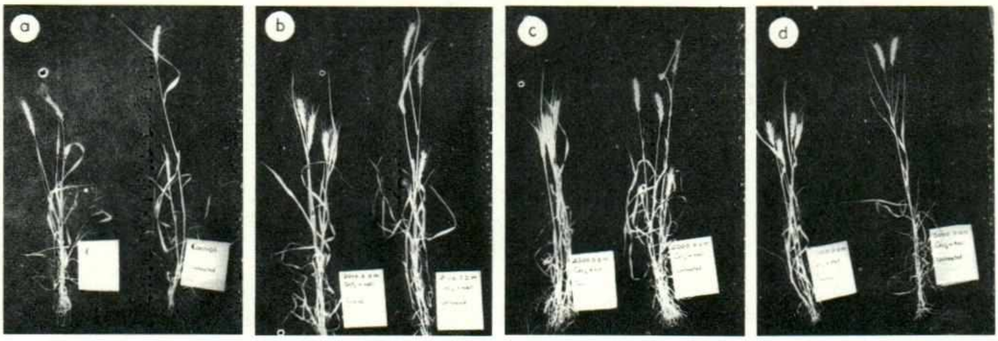

Fig. 1. Response of wheat plant to salinity level with and without CCC treatment: (a) control; (b) 2,000 ppm; (c) 4,000 ppm; and (d) 6,000 ppm.

grain size were significantly increased. Only, the number of spikes per plant was not affected by salinity.

It appears from this study that CCC treatment did not affect wheat plant response to the levels of salinity used. Furthermore, grain yield of individual plants was significantly increased due to salinity irrespective of CCC application.

LITERATURE CITED

1. El-Damaty, H., H. Kuhn, and H. Linser. 1964. A preliminary investigation of increasing salt tolerance of plants by application of (2-chloroethyl)-trimethyl ammonium chloride. Agrochimica 8(2): 129–138.
2. El-Fouly, M. M. 1970. Effect of the growth regulant-cycocelon wheat. El-Felaha, 50(5):403–430 (In Arabic).
3. El-Kobbia, T., M. Omar, and A. H. El-Damaty. 1969. Effect of cycocel on tolerance of wheat plant to salinity. Confr. Soil Sci. Soc. Abs. U.A.R. El-Felaha, 49(2):134 (In Arabic).
4. El-Sharkawy, M. A., K. Sgaier, and M. M. Ramadan. 1973. Response of wheat to cycocel application. I-effect of nitrogen level and CCC concentration on plant height of dwar and tall wheat. Libyan J. Agric. 2:13–19.
5. ———, ———, ———. 1973. Response of wheat to cycocel (CCC) application. II-effects of nitrogen level and CCC concentration on yield components of dwarf and tall wheat (Triticum aestivum). Libyan J. Agric. 2:21–26.
6. Humphries, E. C. 1968. CCC and cereals. Field Crop Abstract 21:13–19.
7. Humphries, E. C., P. J. Welbank, and E. D. Williams. 1967. Interaction of CCC and water deficit on wheat yield. Nature 215:782.
8. Humphries, E. C., P. J. Welbank, and K. J. Witts. 1965. Effect of CCC on growth and yield of spring wheat in the field. Ann. Appl. Biol. 56:351–361.