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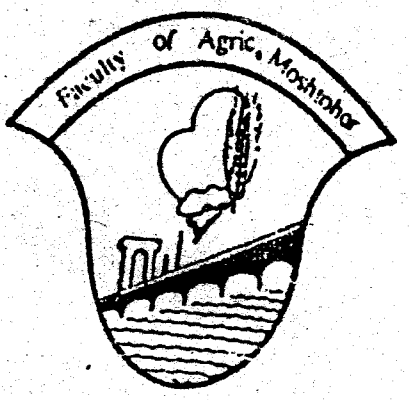

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EFFECT OF CYCOCEL FOLIAR SPRAY ON VEGETATIVE GROWTH, CHEMICAL COMPOSITION, FLOWERING, YIELD AND QUALITY OF PEA PLANTS GROWN UNDER SALINITY STRESS

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ABSTRACT

A pot experiment was carried out in the Experimental Farm of Fac. Agric. at Moshtohor in two successive winter seasons of 1990/1991 and 1991/1992 to elucidate the effect of cycocel foliar spray at 0, 250 and 500 ppm on growth, chemical composition, yield and quality of pea plants grown under salinity stress of sodium in either chloride or sulphate form and at concentrations of 6000 and 9000 ppm.

Obtained results showed that salinity at the studied concentrations and in both forms of Na (chloride or sulphate) significantly depressed all studied growth aspects, i.e., plant height, number of leaves and fresh and dry weight of plant. Contrary to this effect, spraying plants with cycocel especially at low concentration significantly reduced the depressive effect of salinity on such growth parameters. In addition usage of saline water in irrigation has a decrement effect on photosynthesis pigments (chlorophyll a & b) and estimated macro-nutrients (N, P and K). However, it led to an increase in both Ca and Na content of plant foliage. In this regard, spraying pea plants with cycocel tended to reduce the decrement effect of salinity on such estimated chemical constituents and increased its content.

Obtained results show also that irrigating pea plants with saline water containing Na-salts either in chloride or sulphate form in its different used concentrations reduced the number of days elapsed to the anthesis of the first flower, lowered the position of the first flower node, decreased number of flowers and pods per plant, average pod weight and yield of pods per plant as well as number of seeds per pods. Moreover, it decreased the content of N, P and K and increased Na and Ca content of produced seeds. However, spraying pea plants with CCC especially the depressive effect of salinity on all aforementioned

flowering and yield parameters as well as chemical constituents of produced seeds.

INTRODUCTION

The problem of salinity in irrigation water is increasingly receiving much attention in Egypt as well as other countries. It is generally recognized that the presence of salt in irrigation water or growth media in concentration much more than those required for normal plant function determine the vegetative growth and the quantity as well as quality of pea plant production (Khadr et al., 1980; Abd El-Dayem, 1982; Abdalla, 1985 and Abed et al., 1986). Moreover, salinity hazards showed also a depressive effect on the vital chemical constituents of plant, i. e., photosynthetic pigments content, (Abdalla, 1985 and Abed et al., 1986) and macro-elements content N, P and K in both plant foliage and produced seeds (Malik et al., 1977; Khadr et al., 1980 and Abdalla, 1985). On the other hand, Na and Ca content of different plant parts was increased as a result of using saline water in irrigation (Abd El-Dayem, 1982 and Abdalla, 1985).

The need for overcoming the adverse effect of salinity pushed the investigators to test some growth regulators and other substances to ameliorate the adverse effect of salinity. In this respect, Ghazi (1976) and Moustafa et al., (1981) reported that CCC treatment counteract the adverse effect of salinity on broad bean growth and increased plant height, number of leaves and fresh weight as well as dry weight per plant. Such effect was higher at relatively low and moderate levels of salinity. In addition, Foda et al., (1973), Ghazi (1976), Seham et al., (1977) and Moustafa et al., (1981) indicated that, treatment broad bean plants grown under salinity stress with growth retardant (CCC) increased number of infloresence, fruits and total yield of pods per plant. Such increase was more pronounced at relatively moderate and high levels of salinity.

Therefore, this study was conducted to investigate the effect of CCC on growth, yield and durability of pea plants grown under salinity stress.

MATERIALS AND METHODS

A pot experiment was conducted at the Experimental Farm of the faculty of Agriculture at Moshtohor during the winter seasons of 1990/1991 and 1991/1992.

It included 15 treatments which were the combination of five salinity treatments, i. e., 6000 and 9000 ppm for each of chloride (NaCl) and sodium sulphate (Na_2SO_4) in addition to the control treatment combined with three concentrations of cycocel, i. e., 0. 250 and 500 ppm. Seeds of pea (Pisum sativum, L.) cv. Little Marvel were sown in 30 cm clay pots on October 25th and 15th in 1990 and 1991, respectively. Pots were treated with tar and their weight was adjusted with gravel and filled with 6 kg clay soil. The soil was loamy in texture with pH 7.7 and contains 1.5% organic matter, 0.103 available N, 2.74 ppm soluble-P, 0.5 meq/l. K, 9,7 meq/l. Na, 3.5 meq/l. Cl and 15 meq. SO_4. Pots were irrigated with tap water till complete germination. Thinning was done leaving only four uniform plants per pot. Pots were irrigated with saline solutions every three days with 700 ml to keep the water content at field capacity. Each treatment was consisted of three pots and then three replicates were adopted. Plants were fertilized with each of N, P_2O_5 and K_2O at a rate of 2 gm/pot after 3 and 5 weeks from seeds sowing. Plants were sprayed three times with the different studied concentrations of cycocel at 2, 4 and 6 true leaf stages. Pots were arranged in split design where salinity treatment represent the main plots and the spray treatment arranged as sub-plots. Other agricultural treatments were done as cultivation, pest control in the suitable time.

Data recorded :-

A- Vegetative growth, at full blooming stage two plants from each treatment were randomly taken for measuring the vegetative growth parameters, i. e., plant height (cm), number of leaves per plant and fresh and dry weight/plant (gm).

B- Flowering characters, were measured as date of flowering in day (calculated as number of days elapsed from sowing up to the anthesis of the first flower), number of the node on which the first flower appears and total number of flowers per plant.

C- Yield and its components. At harvest, the mature green pods for each treatment were collected and the following data were recorded. Number of pods per plant, average weight of pod and pods yield per plant as well as number of seeds per pod.

D- Chemical constituents, were assayed in plant foliage and green seeds as follows.

1- Photosynthetic pigments, i. e., chlorophyll (a), (b) and carotenoids were assayed in plant foliage according to the method described in A.O.A.C. (1970).
2- Mineral elements, N, P, K, Na and Ca were determined either in plant foliage or green seeds according to the methods used by Pregl (1945), Murphy and Riely (1962), Brown and Lilleland (1946) and Richards (1954) respectively.

All obtained data were subjected to statistical analysis according to Gomez and Gomez (1983).

RESULTS AND DISCUSSION

1- Vegetative growth:

Data illustrated in Table (1) show clearly that both sources and levels of water salinity exerted a depressive effect on the different studied growth parameters, i. e., plant height, number of leaves per plant as well as fresh and dry weight per plant. In this respect, the highest concentration of Na-salts (9000 ppm) reflected the highest depressive effect on all the forementioned growth aspects compared to the other concentration (6000 ppm) and the control. In addition, sulphate form proved to be of less determintal effect compared with chloride. Such depressive effect of salinity on plant growth may be attributed to the accumulation of salts in growth media that may unsuitable conditions for water and mineral uptake by plant which may exert some disturbances in metabolic aspects leading to such plant growth inhibition. Obtained results agree with those reported by Khadr et al. (1980), Abd El-Dayem (1982), Abdalla (1985) and Abed et al. (1986).

Concerning the effect of cycocel treatments the same data in Table (1) reveal that irrespect of plant height which was decreased, number of leaves, fresh and dry weight per plant were increased as a result of cycocel application during both seasons of growth. In this regard, the highest increments were obtained in case of sprying pea plants with the low concentration (250 ppm) of cycocel compared with the control and the higher used concentration (500 ppm). Obtained results may be due to cycocel at low concentration may be a source of N which considered the major element in the formation of protoplasm. Such results are agree with those obtained by Rafique-Uddin (1984) on bean and Khalil (1990) on cowpea, they reported that most concentrations of tested substance (CCC) showed promotive effect on number of

Table (1): Effect of cycocel on morphological charateristics of pea plants grown under salinity stress.

Season			1990/1991				1991/1992			
Salinity conc. ppm		Cycocel conc. ppm	Plant height (cm)	No. of leaves/ plant	Fresh weight (g)	Dry weight (g)	Plant height (cm)	No. of leaves/ plant	Fresh weight (g)	Dry weight (g)
0		0	30.6	12.6	8.8	2.0	29.3	13.3	11.3	2.3
		250	28.2	14.6	11.6	2.1	23.0	14.6	11.9	2.3
		500	27.0	14.3	11.9	1.9	21.6	13.6	10.9	1.8
NaCl	6000	0	24.6	10.3	6.3	1.0	21.3	10.6	6.8	1.5
		250	25.3	12.3	7.7	1.6	22.3	11.6	7.7	1.8
		500	21.0	10.6	5.6	1.2	18.3	11.0	4.7	1.5
	9000	0	21.0	11.0	6.0	1.0	21.1	9.5	4.9	1.1
		250	20.3	12.0	6.8	1.3	19.3	11.0	6.1	1.6
		500	16.0	10.3	5.1	1.3	16.6	10.3	4.2	1.5
Na_2SO_4	6000	0	24.6	10.3	7.9	1.4	24.0	11.3	7.2	1.7
		250	25.6	12.3	9.2	2.1	24.0	12.0	8.3	2.1
		500	22.0	12.3	6.1	2.1	22.0	11.6	6.2	1.4
	9000	0	20.6	10.0	6.7	1.2	21.5	9.7	6.2	1.3
		250	22.6	11.0	8.7	2.1	22.0	12.0	7.9	1.4
		500	21.3	11.0	5.8	1.8	21.0	11.3	6.9	1.4
L.S.D. at 0.05			N.S	N.S	1.1	0.3	N.S	N.S	0.9	0.4
Control	0		25.2	13.8	10.7	2.0	24.6	13.8	11.3	2.1
NaCl	6000		23.6	11.1	6.5	1.3	20.6	11.0	6.4	1.6
	9000		19.1	11.1	5.9	1.2	19.0	10.2	5.1	1.4
Na_2SO_4	6000		24.0	11.6	7.7	1.8	23.3	11.6	7.2	1.7
	9000		21.5	10.6	7.1	1.4	21.5	11.0	7.0	1.3
L.S.D. at 0.05			1.5	0.9	1.0	0.2	2.5	1.0	0.6	0.2
		Control	24.3	10.7	7.1	2.2	23.4	10.8	7.2	1.5
		250	24.4	12.4	8.8	1.8	22.1	12.2	8.3	1.8
		500	21.4	11.7	6.9	1.6	19.9	11.5	6.6	1.5
L.S.D. at 0.05			1.3	0.7	0.9	0.2	1.7	0.7	0.8	0.2

both leaves and lateral branches as well as dry matter content of plant.

Regarding the interactive effect, it is obvious from the same data in the Table (1) that spraying pea plants grown under salinity stress with cycocel especially at low concentration (250 ppm) counteracts the depressive effect of salinity on all studied growth parameters. In this respect, the highest concentration of CCC (500 ppm) intensified the depressive effect of salinity in most studied growth aspects. Ghazi (1976) and Moustafa et al. (1981) on broad bean obtained similar results.

2- Chemical composition of plant foliage:

A- Photosynthetic pigments:

It is evident from data presented in Table (2) that, chlorophyll (a) and (b) were significantly decreased as a result of irrigating pea plants with the saline water. The highest depressive effect was achieved at the highest salinity concentration (9000 ppm) for Na-salts in its both forms (chloride and sulphate). Such decrease in photosynthetic pigments may be attributed to the effect of salinity on macro-elements uptake which are essential for chlorophyll molecule formation. These results are similar to those obtained by Abdalla (1985) and Abed et al. (1986) on pea.

As for the effect of cycocel, data indicate also that plants content of chlorophyll (a) and (b) statistically increased as a result of spraying plants with cycocel compared to the control treatment. In this regard, the highest concentration of CCC (500 ppm) caused the highest content of photosynthetic pigments. Similar results were reported by El-Tahawi et al.(1982) on bean.

Regarding effect of the interaction between CCC and salinity, it is obvious that, treating pea plants with CCC ameliorate the reducing effect of salinity on such photosynthetic pigments.

B- Minerals content:

It is clear from the same data at Table (2) that total nitrogen, phosphorus and potassium content of plant foliage significantly decreased while sodium and calcium increased as a result of irrigation with saline water. In this concern, the highest salinity level (9000 ppm) resulted in the highest depressive effect. Moreover, sodium salt in the

Table (2): Effect of CCC foliar spray on photosynthetic pigments (mg/100 g F.W.) and minerals concentration (mg/100 g D.W.) in pea plant foliage grown under salinity stress.

Season			1990/1991							1991/1992						
Salinity conc. ppm		Cycocel conc. ppm	Chloro-phyll (a)	Chloro-phyll (b)	N	P	K	Ca	Na	Chloro-phyll (a)	Chloro-phyll (b)	N	P	K	Ca	Na
0		0	130	78	3560	200	3085	1519	242	125	80	3389	200	3041	1610	234
		250	148	91	3629	203	2966	1661	253	136	92	3569	213	2866	1268	271
		500	148	88	3389	190	3033	1576	255	143	93	3420	193	2966	1617	237
NaCl	6000	0	143	71	3195	180	2783	1273	363	119	76	3249	185	2700	1683	256
		250	127	78	3330	185	2766	1700	304	127	78	3420	188	2816	1565	292
		500	143	83	3299	185	2760	1722	303	130	84	3269	191	2733	1683	306
	9000	0	124	61	3105	162	2680	1771	396	109	51	3060	180	2640	1680	366
		250	133	65	3114	181	2700	1601	333	120	74	3299	181	2666	1639	309
		500	114	70	3060	178	2733	1653	320	105	71	3119	185	2666	1705	317
Na_2SO_4	6000	0	123	67	3375	187	2850	1496	319	117	71	3339	190	2720	1683	297
		250	152	87	3690	195	2773	1744	278	140	65	3510	191	2733	1672	279
		500	162	75	3389	185	2770	1744	324	140	70	3389	196	2700	1804	299
	9000	0	120	63	3269	170	2680	1617	329	111	52	3150	175	2660	1694	323
		250	133	71	3659	180	2715	1774	341	119	62	3420	178	2670	1672	288
		500	148	83	3294	168	2763	1749	315	132	55	3209	188	2600	1892	302
L.S.D. at 0.05			3	1	14	4	60	91	16	4	2	31	128	68	101	4
Control	0		142	85	3526	197	3028	1585	250	135	88	3459	202	2957	1498	247
NaCl	6000		134	77	3252	183	2753	1565	323	125	79	3312	191	2749	1643	285
	9000		124	65	3093	173	2704	1675	349	111	65	3159	182	2657	1674	330
Na_2SO_4	6000		146	76	3485	189	2797	1661	307	132	68	3412	192	2717	1719	291
	9000		134	72	3407	172	2719	1713	328	120	56	3259	180	3310	1752	304
L.S.D. at 0.05			3	1	16	3	25	25	16	3	1	13	N.S	33	70	1
Cycocel		0	126	68	3287	179	2806	1535	325	116	66	3237	186	2752	1670	295
		250	138	78	3484	188	2784	1696	301	128	74	3443	190	2750	1563	287
		500	143	79	3286	181	2811	1688	303	130	74	3281	190	2713	1740	292
L.S.D. at 0.05			4	2	6	2	30	40	7	1	2	14	N.S	33	70	2

chloride form was more effective than sodium salt in the sulphate form.

These obtained results are confirmed with those reported by Malik et al. (1977), Khadr et al. (1980), Abdalla (1985) and Abed et al. (1986) on pea.

Concerning the effect of cycocel it is clear that all the studied macro-elements, except Na, were increased as a result of spraying the plants with cycocel. Such results are connected with the increasing in vegetative growth aspects and consequently the uptake of such macro-nutrients was increased. Khalil (1990) on cowpea reported similar results. Regarding the interaction effect, the same data show that spraying pea plant with different studied concentration of CCC reduced the decreasing effect of salinity on the uptake of macro-nutrients, i.e., N,P,K and Ca. In the same time, it decreased the uptake of Na especially at the low level (250 ppm).

4- *Flowering characteristics:*

Data presented at Table (3) reveal that all salinity treatment significantly decreased the studied flowering aspect, i.e., number of days elapsed to the anthesis of the first flower, lowered the position of the first flower on the stem and decreased the number of flowers per plant. In this respect, the highest used level of salinity (9000 ppm of NaCl or Na^2 SO^4) showed the highest depressive effect on all forementioned flowering criteria during both seasons of growth. Such results may be due to the effect of salinity on the uptake of macro-elements (Table, 2) which exert shortening of vegetative phase leading to force the plant to come early to flowering phase before completing its normal vegetative growth. Obtained results are in confirmity with those reported by Uprety and Sarin (1975) and Abd El-Dayem (1982), on pea who reported that salinity treatments had a depressive effect on various flowering aspects.

Regarding the effect of CCC, the same data in Table (3) indicated that CCC treatments tented to increase all the studied flowering aspects. Such increments reached the level of significancy only in case of number of flowers produced per plant during the growing seasons. In this respect, the lower concentration (250 ppm) proved to be the most effective treatment compared with the highest one and the control treatment.

Table (3): Effect of CCC foliar spray on flowering characteristics of pea plants grown under salinity stress.

Season			1990/1991			1991/1992		
Salinity conc, ppm		Cycocel conc, ppm	Flowering time (day)	No. of first flower node	No. of flowers/ plant	Flowering time (day)	No. of first flower node	No. of flowers/ plant
0		0	46.0	11.0	13.0	46.9	10.8	13.0
		250	45.0	10.5	13.0	46.0	10.5	13.0
		500	45.0	10.0	12.9	43.0	10.5	12.0
NaCl	6000	0	44.0	7.8	7.3	43.8	7.5	7.0
		250	45.0	8.8	8.9	45.0	8.1	9.9
		500	44.7	8.0	8.0	45.0	7.5	8.0
	9000	0	42.9	6.5	6.0	43.0	6.6	5.1
		250	43.0	7.0	6.1	43.9	7.0	7.0
		500	43.0	6.0	4.0	43.0	6.8	5.0
Na_2SO_4	6000	0	43.0	7.9	8.0	42.0	8.5	8.0
		250	41.9	8.0	9.0	43.0	8.0	11.8
		500	44.1	7.5	7.0	43.0	7.5	8.0
	9000	0	41.0	7.2	6.9	40.0	7.8	8.0
		250	41.0	7.5	7.0	41.1	8.0	7.0
		500	41.5	7.0	6.0	41.0	7.7	7.0
L.S.D. at 0.05			N.S	N.S	0.9	1.2	N.S	1.7
Control	0		45.3	10.5	12.9	45.3	10.6	12.6
NaCl	6000		44.5	8.2	8.0	44.6	7.7	8.3
	9000		42.9	6.5	5.3	43.3	6.8	5.7
Na_2SO_4	6000		43.0	7.8	8.0	42.6	8.0	9.3
	9000		41.1	7.2	6.6	40.6	7.8	7.3
L.S.D. at 0.05			1.7	0.4	2.1	1.7	0.5	1.7
Cycocel		0	43.3	8.0	8.2	43.1	8.2	8.2
		250	43.1	8.3	8.4	43.8	8.3	9.7
		500	43.6	7.7	7.5	43.0	8.0	8.0
L.S.D. at 0.05			N.S	N.S	0.4	0.5	N.S	0.7

Table (4): Effect of CCC foliar spray on pod yield and its components of pea plants grown under salinity stress.

Season			1990/1991				1991/1992			
Salinity conc. ppm		Cycocel conc. ppm	No. of pods/ plant	Pod weight (g)	Yield/ plant (g)	No. of seeds/ pod	No. of pods/ plant	Pod weight (g)	Yield/ plant (g)	No. of seeds/ pod
0		0	4.3	3.8	16.4	4.4	5.0	3.5	17.6	5.0
		250	4.3	4.2	18.0	4.6	5.7	4.5	25.6	5.3
		500	4.6	4.2	19.3	4.6	4.7	4.2	19.7	4.8
NaCl	6000	0	2.5	3.1	7.7	4.3	6.6	2.3	15.1	3.3
		250	3.6	3.6	13.0	4.6	4.5	3.9	17.5	4.1
		500	3.0	3.3	9.9	4.4	4.7	3.5	16.4	3.7
	9000	0	1.9	2.1	3.9	2.5	2.7	1.6	4.2	2.7
		250	2.3	2.8	6.4	3.3	2.9	2.4	6.9	3.2
		500	2.1	2.4	5.0	3.2	2.0	2.5	5.0	3.0
Na_2SO_4	6000	0	2.8	3.3	9.1	4.0	2.7	4.5	12.2	3.7
		250	3.8	3.7	14.1	4.4	3.9	4.3	16.7	4.2
		500	3.6	3.9	14.0	4.5	3.6	3.8	13.6	4.1
	9000	0	2.2	2.3	5.1	3.1	3.0	1.8	5.6	3.0
		250	3.4	2.7	9.2	3.8	2.4	3.5	8.4	3.2
		500	2.7	2.5	6.8	3.6	2.1	3.1	6.5	3.3
L.S.D. at 0.05			0.1	N.S	1.3	N.S	N.S	N.S	N.S	0.5
Control	0		4.3	4.0	17.9	4.5	5.1	4.1	20.9	5.0
NaCl	6000		3.0	3.3	10.2	4.4	5.3	3.2	16.3	3.7
	9000		2.1	2.4	5.1	3.0	2.5	2.2	5.3	2.9
Na_2SO_4	6000		3.4	3.6	12.3	4.3	3.4	4.2	14.1	4.0
	9000		2.7	2.5	7.0	3.5	2.5	2.8	6.8	3.1
L.S.D. at 0.05			0.1	0.1	0.6	0.2	0.5	0.3	2.0	0.5
Cycocel		0	2.7	2.9	8.4	3.6	4.0	2.7	10.9	3.5
		250	2.7	5.6	11.6	4.1	3.8	3.7	15.0	4.0
		500	3.2	5.4	11.0	3.9	3.4	3.4	10.5	3.7
L.S.D. at 0.05			0.1	0.1	0.6	N.S	0.3	0.2	0.8	0.2

Data presented in Table (5) show the seeds content of some macro-nutrients. It is obvious that usage of the saline water for irrigation resulted in decreasing seed content of N, P and K as compared with their content of the same elements upon utilization of the tap water. The decrease was more pronounced by increasing concentration of salts in the irrigation water from 6000 up to 9000 ppm weather sodium salt was in the chloride form or the sulphate one. Moreover, it could be noticed that the chloride form was more effective in decreasing the seed content of the investigated elements (N, P and K). Such an effect of salinity on seeds content of N, P and K is comparable to that of salinity on the vegetative parts content of the same elements (Table, 2) and the results obtained here are similar to a large extent to those obtained by Khadr et al;, (1980) and Abdalla (1985) on pea. Such reduction of N, P and K uptake could be attributed to the disturbances in ion absorption due to the toxicity of one or more specific (Na and/or Cl) ion present in high concentration, (Strganov, 1964). Also, interaction between N and P in soils may be lead to coprecipitation of ammonium and phosphate (Lehr et al., 1967). However, it is difficult to generalize on the effects of these interactions on plant nutrition because the compounds vary from highly available to very slowly available as sources of N and P to plants, (Lehr et al., 1967). On the other hand, availability of both P and K may be reduced due to potassium coprecipitation with P, precipitation of K in P precipitation is more pronounced in soils with high exchangeable K or with easily decomposed K-bearing minerals. Thus, such interactions result in a decrease in soil content of available K and P and consequently their uptake by the plants. On the other hand, data show that increasing the irrigation water concentration of the salts was associated with increase in the seeds content of both Na and Ca. The increase in seeds content of Na is expected since Na is the only basic radical in the irrigation water which means a consequently increase in the soil content of this element and its uptake by the plants.

Regarding the effect of CCC on the seeds content of the forementioned elements, data in Table (5) reveal that spraying pea plants with CCC increased markedly the seeds content of N, P, K and Na but on the other hand decreased the seeds content of Ca, especially at the low concentration of CCC (250 ppm).

Table (5): Effect of CCC foliar spray on minerals concentration (mg/100g D/W) in green seeds of pea plants grown under salinity stress.

Season			1990/1991					1991/1992				
Salinity conc, ppm		Cycocel conc, ppm	N	P	K	Ca	Na	N	P	K	Ca	Na
0		0	3573	233	2390	1705	34	3735	235	2400	1529	37
		250	3629	258	2406	1639	53	3809	250	2416	1612	51
		500	3600	245	2493	1661	48	3629	249	2413	1832	50
NaCl	6000	0	3330	220	2260	2035	91	3393	210	2270	1595	95
		250	3375	246	2346	1755	83	3510	231	2316	1620	91
		500	3285	208	2493	1766	95	3389	212	2336	1763	88
	9000	0	3204	200	2170	2167	96	3240	200	2200	2002	97
		250	3269	230	2216	1939	88	3330	227	2210	2057	95
		500	3209	202	2310	1980	136	3240	200	2260	2052	96
Na_2SO_4	6000	0	3393	230	2280	1925	97	3420	221	2290	1606	82
		250	3420	256	2406	1700	108	3569	244	2336	1568	110
		500	3359	240	2496	1843	82	3420	246	2342	1873	93
	9000	0	3288	215	2173	2090	104	3285	210	2220	2145	91
		250	3299	250	2253	1914	118	3330	242	2273	2162	112
		500	3299	230	2310	2220	82	3269	237	2285	2203	104
L.S.D. at 0.05			11	N.S	21	21	3	15	N.S	24	19	4
Control	0		3600	248	2429	1668	45	3724	244	2409	1657	46
NaCl	6000		3330	224	2366	1852	89	3430	217	2307	1659	90
	9000		3227	210	2232	2028	106	3270	209	2223	2037	96
Na_2SO_4	6000		3390	242	2394	1822	96	3469	237	2322	1682	95
	9000		3295	231	2245	2074	101	3294	229	2259	2170	102
L.S.D. at 0.05			7	8	18	17	2	12	10	19	12	3
Cycocel		0	3358	219	2254	1984	84	3215	215	1880	1775	80
		250	3380	248	2325	1789	90	3509	239	2310	1803	91
		500	3350	225	2420	1894	88	3389	228	2327	1944	86
L.S.D. at 0.05			5	3	10	8	2	7	3	11	9	2

As for the effect of the interaction, it is obvious from the same data that, cycocel treatments tented to ameliorate the effect of salinity treatments on the uptake and translocation of such determined mineral elements.

Generally, it could be concluded that under such condition cycocel at 250 ppm was recommended for reducing and ameliorating the depressive effect of salinity on growth, yield and quality of pea plants.

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تأثير الرش بالسيكوسيل على النمو الخضرى والتركيب الكيماوى والازهار والمحصول وجودته لنباتات البسلة النامية تحت تأثير الملوحه

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اجريت تجربة أصص بمزرعة التجارب بكلية زراعة مشتهر خلال الموسم الشتوى لعامى ١٩٩١/٩٠ ، ١٩٩٢/٩١ لدراسة تأثير الرش بالسيكوسيل بتركيزات صفر ، ٢٥٠ ، ٥٠٠ جزء فى المليون على النمو والتركيب الكيماوى والمحصول والجودة لنباتات البسلة النامية تحت تأثير الملوحة حيث كانت على صورة كلوريد أو كبريتات الصوديوم عند تركيزات ٦٠٠٠ ، ٩٠٠٠ جزء فى المليون لكل منهما.

وقد أظهرت النتائج المتحصل عليها ان الملوحة عند التركيزات المدروسة وعلى صورة كلوريد أو كبريتات قللت معنويا كل مظاهر النمو معبرا عنه بارتفاع النبات وعدد الاوراق والوزن الغض والجاف للنبات. وعلى عكس هذا التاثير فان رش النباتات بالسيكوسيل خاصه عند التركيز المنخفض قد قلل معنويا من التأثير السيئ للملوحة على القياسات الخضرية . وبالاضافة الى ذلك فان استخدام الماء المالح فى الرى أدى الى نقص فى صبغات التمثيل الايضى (كلوروفيل أ ، ب) وكذلك العناصر الكبرى (ن ، فو ، بو) الا أن كل من الكالسيوم والصوديوم قد زاد فى النبات. وفى هذا الخصوص فان رش نباتات البسلة بمادة السيكوسيل قد قلل التأثير السيئ للملوحة على المكونات الكيماوية وزيادة محتواها بالنبات.

كما قللت الملوحة أيضا عدد الايام اللازمة لتفتح أول زهرة وخفض موقع أول عقدة زهرية كما قللت عدد الازهار والقرون للنبات ومتوسط وزن القرن ومحصول القرون للنبات وأيضا عدد البذور بالقرن . علاوة على ذلك فان الملوحة قد قللت محتوى البذور الخضراء من ن ، فو ، بو ، وزادت من الصوديوم والكالسيوم . الا أن رش نباتات البسلة بمادة السيكوسيل خاصه التركيز ٢٥٠ جزء فى المليون قد أدى الى تقليل التأثير الضار للملوحة على الصفات الزهرية والمحصولية وايضا المكونات الكيماوية للبذور.