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EFFECT OF IONIC NATURE OF SALT SOLUTIONS ON THE PERFORMANCE OF PERIWINKLE

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Plant may tolerate total salinity within their tolerance limits, but the change in ionic nature of the solution of the same concentration may alter their tolerance limits. Some literature is available to explain the effect of ionic nature of solutions on field crops (Agarwal et al. 1964), but the effect is unknown in case of "periwinkle" *(Catharanthus roseus)* a plant of medicinal importance due to anti-cancer activity of its alkaloids. Keeping this in view, the present study was undertaken to see the effect of various salt ions on the performance of "periwinkle" and pH and ECe of the soil.

An experiment was conducted (replicated 4 times) in a randomised block design in micro plots (2x2 m) on a sandy loam soil having the following characteristics: pH 7.9, organic carbon 0.12%, ECe 1.65 dSm^{-1}, available N 76 kg ha^{-1}, available P_2O_5 17.6 kg ha^{-1}, available K_2O 460.2 kg ha^{-1}. Six type of salt solutions having 80 meL^{-1} concentration were prepared by dissolving NaCl, $CaCl_2$, $MgCl_2$, Na_2SO_4, $NaHCO_3$, and Na_2CO_3 in distilled water and were applied to "periwinkle". Before planting N,P and K were applied @ 20, 30 and 30 kg ha^{-1}, respectively. The "periwinkle" seedlings 150 days old were transplanted on 15th July 1987. In each microplot six plants were maintained. After transplanting of seedlings in the micro plots salt water solutions were applied six times during the study period on 15th July; 16th August; 20th October; 12th November; 5th December 1987 and 8th February 1988. Ordinary water was also applied after 15 days of every salt water irrigation. The observations were recorded with respect to number of leaves, branches, plant height and dry matter yield, in December 1987 and March 1988. The leaf samples were washed with a jet of water, dried (65°C) and processed for the estimation of N,P,K, Na, Ca and Mg by following the methods outlined by Piper (1966). Soil samples were drawn at the time of leaf picking to see the changes with respect to pH and ECe by adopting standard procedures.

$MgCl_2$ salt solutions gave on an average higher number of branches and plant height followed by $CaCl_2$ as compared to other salt solutions (Table 1). Dry matter yield with $CaCl_2$ was found superior over $MgCl_2$ and showed 14.8, 11.2, 64.0, 118.3 and 67.4% more dry matter yield over NaCl, $MgCl_2$, Na_2SO_4, $NaHCO_3$ and Na_2CO_3

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Table 1. Effect of the salt solutions on height, branches and dry weight (DW) of leaves of periwinkle (g plant^{-1})

Solutions	Height		Branches		DW	
—	*	**	*	**	*	**
NaCl	65	69	17	31	9.4	11.5
$CaCl_2$	69	78	12	28	7.5	16.5
$MgCl_2$	79	88	15	34	9.1	12.5
Na_2SO_4	65	69	14	19	7.1	7.5
$NaHCO_3$	61	65	12	16	6.5	4.5
Na_2CO_3	63	69	14	27	7.8	6.5
CD 5%	NS	NS	NS	NS	0.5	4.4

*December 1987; **March 1988; NS=Non Significant.

respectively. The treatment effect of various salt solutions was found highly significant.

The effect of different salt solutions on the chemical composition of leaves (Table 2) revealed that with various salt solutions N concentration was found 20.8% more in second picking in comparison to first picking. In second picking, maximum N content of 3.50 and 3.45% was found in Na_2CO_3 and $NaHCO_3$ treatments, respectively.

Second picking samples were found to have significant effect on P concentration in leaves. The increase in P concentration with $NaHCO_3$ during second picking may be attributed to an increase of tissue P and this is in confirmity with the earlier findings of Agarwal et al. (1964).

In comparison to other salt treatments $CaCl_2$ and $MgCl_2$ salt solutions accumulated more K towards second picking. Maximum K concentration was found with $CaCl_2$ treatment. Earlier Agarwal et al. (1964) have also reported low content of K with Na_2CO_3 and $NaHCO_3$.

More Na was found in the leaves of periwinkle with $NaHCO_3$ salt solution application over $CaCl_2$ and $MgCl_2$ treatments. Presence of Na in solution seems to be responsible for its higher concentration in leaves (Sarin 1960).

Ca content varied from 0.76 to 1.3% in first picking and 1.20 to 1.90 per cent in second picking. In first picking Ca concentration was found minimum with Na_2CO_3 treatment (0.76%) which can be ascribed to detrimental effect.

There was no significant effect of various salt solutions on the Mg content of leaves, however, comparatively higher values were recorded with the application of $MgCl_2$ and $CaCl_2$.

Table 2. Effect of the salt solutions on the mineral composition of dry leaves of periwinkle during December 1987 (1) and March 1988 (2)

Solutions	Mineral composition (%)											
	N		P		K		Na		Ca		Mg	
	1	2	1	2	1	2	1	2	1	2	1	2
NaCl	1.21	2.30	0.41	0.51	0.49	0.65	0.60	0.53	1.30	1.80	0.29	0.59
$CaCl_2$	3.65	3.00	0.51	0.53	0.48	1.16	0.49	0.36	1.30	1.90	0.32	0.68
$MgCl_2$	2.62	3.10	0.54	0.53	0.41	0.86	0.52	0.30	1.20	1.20	0.36	0.67
Na_2SO_4	2.25	3.32	0.47	0.53	0.34	0.64	0.58	0.62	1.10	1.90	0.28	0 50
$NaHCO_3$	3.40	3.45	0.36	0.54	0.42	0.70	0.61	0.96	1.20	1.60	0.26	0.55
Na_2CO_3	2.32	3.50	0.32	0.53	0.40	0.50	0.54	0.86	0.76	1.60	0.26	0.32
CD 5%	NS	0.35	NS	0.01	NS	NS	NS	0.12	0.26	NS	NS	NS

NS=Non significant.