Pak.J.Bot., 29(2): 351-354, 1997.

EFFECT OF SEAWATER AND NACL SALINITY ON THE *IN VITRO* GERMINATION OF POLLEN AND TUBE GROWTH OF *CATHARANTHUS ROSEUS* (L) G. DON.

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Gradual and shock treatments of NaCl salinity to wheat (Abdullah *et al.*, 1978) and cotton plant (Abdullah & Ahmed, 1986) are reported to decrease the viability and germination of pollen grain. Sharma *et al.*, (1985) also studied the pollen sterility in two varieties of grapes under different levels of soil salinity and found that increase in salinity from 2 to 8 mmhos/cm decreased the percent viability of pollens by upto 50%. Similarly, an increased spikelet sterility was also found by Murty & Rao (1968) in rice grown under saline conditions. Akbar *et al.*, (1972) are of the opinion that sterility in rice panicles is due to some physiological disorders. The present study describes the *in vitro* effect of seawater and NaCl salinities on germination of pollen and tube growth of *Catharanthus roseus* (L) G. Don.

Pollens were collected from freshly dehisced anthers of *C. roseus* (White flower) and germinated in the basal culture medium of 20% sucrose only. No nutrients were added as the pollens germinated well in sucrose only. Different concentrations of seawater (0.85, 2.3, 9.1, 35.4 $dS.m^{-1}$) and NaCl (0.9, 1.8, 8.4, 38.8 $dS.m^{-1}$) was mixed in the basal medium. Pollen germination was recorded after 10,20 and 30 minutes of incubation in the dark at 32 $\pm$ 2°C. Pollen tube growth was measured after 60 minutes with the help of an ocular micrometer at 40x magnification.

A significant increase in *In vitro* pollen germination of *C. roseus* under the influence of 0.85, 2.3,9.1 and 35.4 dSm^{-1} seawater salinity was observed (Table 1). Similarly, pollen tube growth was also promoted (63 to 80%) by seawater salinities except in 35.4 dSm^{-1} salinity where a very slight promotion was observed. When pollens were treated with 0.9, 1.8, 8.4, and 38.8 $dS.\ m^{-1}$ NaCl salinities, only 0.9 dSm^{-1} promoted and 8.4 dSm^{-1} inhibited the germination and growth of pollens (Table 2). Sharma *et al.*, (1985) also noticed a 50% reduction in pollen viability at 8 dSm^{-1} NaCl treated pollens in two varieties of grapes. Complete inhibition of germination and growth was observed when the pollens of *C. roseus* were grown in 38.8 dSm^{-1} NaCl salinity (Table 2). Thus in both the types of salinities, lower concentration of salt (s) showed maximum promotion of germination and growth of pollens. It is interesting to note that germination and tube growth was found even in 9.1 dSm^{-1} seawater salinity whereas in a relatively lower concentration of 8.4 dSm^{-1} NaCl a significant reduction in germination and growth was observed. This may be due to more increase in Na^+ accumulation in exchange for K^+ in NaCl (single salt) treated pollens as compared to seawater (mixture of salts) treatment. Leaf slices of the halophyte *Atriplex* which was placed in a solution of NaCl accumulated more Na^+ in exchange for K^+ lost from the vacuole (Osmond, 1968). A decrease in the growth of plants due to NaCl salinization is due to the suppression of nutrient absorption such as K^+, Ca^{2+} and Mg^{2+} (Matar *et al.*,

Table 1. Effect of Sea waters salinity on pollen germination and tube growth of *Catharanthus roseus*.

Seawater Salinity EC dS.m-1	Pollen Germination % after 10 min	20 min	30 min	Pollen tube length after 60 min (mμ)
0.25 Water	55.0^{c} ±2.89	62.30^{d} ±1.45	74.00^{e} ±2.08	232.50^{b} ±11.75
0.85	80.0^{a} ±5.78 (145.45)	94.0^{a} ±4.62 (150.88)	99.0^{a} ±1.38 (133.78)	417.50^{a} ±27.0 (179.57)
2.3	72.3^{a} ±1.45 (131.51)	84.3^{b} ±2.33 (135.36)	87.6^{c} ±1.45 (118.46)	377.33^{a} ±14.69 (162.29)
9.1	78.0^{a} ±6.0 (141.18)	90.0^{ab} ±5.0 (144.46)	93.0^{b} ±3.33 (125.67)	413.50^{a} ±42.0 (177.85)
35.4	63.5^{b} ±3.35 (115.45)	73.3^{c} ±1.45 (117.66)	82.5^{d} ±3.31 (111.49)	250.00^{b} ±39.50 (107.53)

Percent of control is shown in parenthesis.

Means followed by same letter are not significantly different at 5% level by Duncan's Multiple range test.

1975; Austenfeld, 1974). Even in the relatively tolerant *Brassica campestris*, increasing concentrations of sodium salts in soil were accompanied by decrease in K^+ and Mg^{2+} contents although N, P, Na^+ and Ca^{2+} concentrations increased in the plant (Ansari, 1972). When equivalent concentration of NaCl and seawater in terms of EC values of 6,8,16 and 32 dSm^{-1} was provided to *Salvadora persica*, Na^+ and Cl^- accumulated more in the leaves with decrease in K^+ content in NaCl treated plants as compared to plants treated with seawater (Joshi *et al.*, 1995). Therefore the decrease in K^+ uptake by salinized plant indicate higher deficiency stress of Ca^{2+}, Mg^{2+} and K^+ in NaCl treated plants rather than seawater treated plants.

The results of the present study supports the findings of Abdullah *et al.*, (1978), Abdullah & Ahmed (1986) and Sharma *et al.*, (1985) that high NaCl salinity induces sterility in pollens. This also indicates that low level of NaCl salinity may not have a direct effect on the sterility of pollens, instead pollens are rather activated by low level of NaCl salinity.

Table 2. Effect of NaCl salinity on pollen germination and tube growth of *Catharanthus roseus*.

NaCl Salinity EC dS.m-1	Pollen Germination % after 10 min	20 min	30 min	Pollen tube length after 60 min (mμ)
0.25 Water	58.0[c] ±4.41	65.30[c] ±2.89	73.00[b] ±1.66	194.00[b] ±22.29
0.90	72.2[a] ±1.66 (124.48)	97.4[a] ±1.20 (148.93)	99.2[a] ±0.66 (135.89)	400.33[a] ±39.71 (206.35)
1.8	63.3[a] ±1.66 (109.14)	70.8[b] ±2.69 (108.26)	76.6[c] ±3.33 (104.95)	216.33[a] ±26.19 (111.51)
8.4	47.8[d] ±3.33 (82.40)	52.5[d] ±4.41 (80.28)	57.6[c] ±3.33 (78.90)	123.66[a] ±12.61 (63.74)
38.8	0[e]	0[e]	0[d]	0[d]

Percent of control is shown in parenthesis.

Means followed by same letter are not significantly different at 5% level by Duncan's Multiple range test.

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(Received for publication 23 April, 1997)