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EFFECTS OF SEA WATER ON GERMINATION AND SEEDLING GROWTH IN *ATRIPLEX GRIFFITHII* MOQ.

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Genus *Atriplex* comprises more than 200 species growing in arid and semi-arid parts of the world and some of them are useful in increasing forage production on saline wastelands (Malcolm, 1980). In the present paper we report the effects of sea water on germination of *Atriplex griffithii* Moq. as well as on growth a.d accumulation of proteins, amino acids, sugars and inorganic ions lika Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^- in 21-day old seedlings.

Germination was carri.d out in culture petri plates lined with Whatman No. 1 filter paper, to which sea water dilutions havin salinity of 8 to 32 milli mhos (mS) cm^{-1} were added. Five replicates of 50 seeds were maintained for each treatment. Seedlings were grown in distilled water and in sea water of 8 mS cm^{-1} for 21 days for further analysis.

Proteins were estimated by Folin-phenol reagent (Lowry et al., 1951) and free amino acids by the paper chromatography. The total sugars were determined by using anthrone reagent method and the reducing sugars by the method of Folin and Malmrose (1929) modified by Umbreit et al. (1959). Na^+ and K^+ were estimated by flame photometry; Ca^{++} and Mg^{++} following Vogel (1978) and chloride (Cl^-) by using chloride metei, mS cm^{-1} Elico model EE-34.

Forty nine per cent seeds germinated under 8 mS.cm^{-1} sea water, 20 per cent in 16 mS cm^{-1} and only two to three per cent in 24 and 32 mS cm^{-1} against 87 per cent germination observed in distilled water (DW). When the seeds (ungerminated in high concentrations of sea water) were kept in DW, total percentage germination reached between 79 to 90. This evidently showed that retardation of germination at higher salinity levels was mainly due to osmotic effects of sea water (Ungar, 1978). Growth study indicated that shoot and root length, which was about 2.2 ± 0.3 cm in DW, increased upto 3 ± 0.2 cm in 8 mhos cm^{-1} sea water treatment. Similarly, fresh weight of single seedling increased from 11 to $18 \pm 0\ 01$ and dry weight from 2 mg to 3 mg, under salinity. Thus, low salinity (8 mS.cm^{-1}) had promotary effects on growth of *A. griffithii*, like other species (MacKe and Ungar, 1971). The close resemblance of protein content of young seedlings and mature leaves, as well as low magnitude of salinity effect on proteins of seedlings (Table 1) indicated that the same were able to withstand salinity of 8 mS cm^{-1} without much damage.

Table 1. Accumulation of proteins, sugars, mineral ions and free amino acids in 21-day old seedlings of *A. griffithii* grown with distilled water (DW) and 8 mS cm^{-1} sea water (SW).

	Proteins (mg g^{-1} dry matter)		
	Alkali	Ethanol	Water
DW	209	100	127
SW	171	113	134

	Sugars (mg g^{-1} dry matter)				
	Total	Reducing	Glucose	Galactose	Arabinose
DW	134	70	0.53	0.50	0.10
SW	150	59	1.40	1.40	0.20

	Mineral ions (meq g^{-1} dry matter)					
	Ash	Na^+	K^+	Ca^{2+}	Mg^{2+}	Cl^-
DW	0.06	0.38	0.28	0.38	0.46	0.24
SW	0.16	1.45	0.23	0.33	0.80	0.88

	Amino acids (μg g^{-1} dry matter)							
	Alanine	γ-amino butyric acid	Aspara gine	Aspartic acid	Glutamic acid	Glutamine	Glycine	Iso-leu-cine
DW	407	140	3296	6185	518	1074	1385	207
SW	350	121	4557	1221	743	486	378	336
	Leucine	Methio-nine	Phenyla-lanine.	Proline	Serine	Threonine	Tyrosine	Valine
DW	281	319	4430	—	822	689	830	363
SW	514	229	4543	Tr	286	664	841	136

Sugars are known to develop the turgor in young seedlings and increased sugar levels in the seedlings of *A. griffithii* under salt stress (Table–1) may have some role in the osmotic adjustment.

Increased accumulation of Na^{+}, Cl^{-} and Mg^{++} under saline condition indicated the possibility that these ions took part in osmoregulation during early growth stage. Greenway (1968) had reported similar behaviour in 31-dayold seedlings of *A. nummularia* grown in NaCl solutions. Sufficient uptake of K^{+} from Na^{+} rich medium supports the existance of dual carrier mechanism proposed by Epstein (1972).

Salinity stress increased the accumulation of asparagine, glutamic acid, isoleucine, phenylalanine and tyrosine in *A. griffithii* (Table–1). Although halophytes are known to accumulate free proline under salt stress, it was detected only in traces during present study.

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