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IONS AND WATER RELATIONS OF MANGROVE (AVICENNIA MARINA) ALONG THE COAST OF THE ARABIAN GULF , SAUDI ARABIA

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ABSTRACT:
ns concentration and water relations of Avicennia marina were studied under natural condition along the coast of the Arabian Gulf , Saudi Arabia . eight trees were selected along 500 m transect of mangrove forest. Since leaves of A. marina have external salt glands hairs a comparison between the ion concentration of "leaf tissues" (leaf excluding salt glands) and leaves "leaf including salt glands was done. The analysis of A. marina leaves in the present study shows that Na+ and Cl- concentrations were much in excess of 200 mmol /m3 in both expanding and expanded leaves. The K+, Ca2+, and Mg2+ concentrations of leaf tissues found in the present study, represent levels usually regarded as adequate for growth. Higher salt concentration in the rooting media of A. marina caused more negative values for leaf water and osmotic potential, increasingly so in expanding leaves.

INTRODUCTION:
Mangroves are woody plants that form the dominant vegetation in tidal, saline, wetlands along tropical and subtropical costs. Salinity is one of the most outstanding environmental features of mangrove swamps and has long been recognized as an important factor regulating physiological processes such as; growth, height, survival and location of mangroves. (Al-Khateeb, 1997; Montemayo,.et al. 2010; Pate, et al.2010).

MATERIAL AND METHODS:
This study was performed along the coast of the Arabian Gulf. Five trees were selected along 500m transect.
Since leaves of A. marina have external salt glands hairs), a comparison between the ion concentration of "leaf tissues" (leaf excluding salt glands) and leaves "leaf including salt glands was done. Salt glands were removed from one group of leaves with a fine point brush under a stereomicroscope during washing for 60-90 seconds in sorbitol solution isotonic to the seawater. The second group was only briefly rinsed in distilled water without brushing to remove the surface salt prior to analysis. All samples after drying at 80oC for 48 hours were ground and kept in polyethylene bags for ion analysis.
About 200 mg of the milled sample was accurately weighted into test tube with 5 ml of concentrated nitric acid. The test tube was washed by an excess amount of distilled water and the volume made up to 50 ml. Na+ and K+ were determined in the stock solution by flame photometer. Other ions analysis were done using Atomic Absorption Spectrophotometer according to AOAC, 1989).
Leaf water and osmotic potential were measured with a Wescor HR-33T Devv Point Microvoltmeter (Model 5103 Wescor Inc. Logan, Utah) equipped \virh C52 sample chambers. Each chamber was calibrated with salinity series ranging from 0.1 to 2. 0 M NaCl solutions.

RESULTS AND DISCUSSION:
The present study indicate substantial increase in Na+, and Cl- concentration in leaf tissues as leaf aged which maintaining high concentrations of Na+ and Cl- in fully expanded leaves. This helps senescence to play a relief mechanism to regulate Na+ and Cl- concentration in mangrove palnts. However, the K+, (Ca2+, and Mg2+ data not shown) concentrations of leaf tissues found in the present study, represent levels usually regarded as adequate for growth of mangrove.

Table (1): Means of Na+, K+ , Cl- (m mol/g fresh weight) in the different leaf categories of Avicennia marina grown along Arabian gulf. Leaves were analyzed with either salt hair (salt glands) intact (A) or removed (B) .

Leaf categories		Na+	K+	Cl-
Expanding leaves	A	580 ab	125 a	461 ab
	B	460 b	101 b	402 b
Recently expanded leaves	A	628 a	126 a	532 a
	B	551 b	95 c	478 ab
Fully Expanded leaves	A	724 a	112 a	441 ab
	B	580 ab	107 b	413 b

Means followed by the same letter(s) in the same colum in each comparison are not significantly differ at 5% level of probability.

Table (2): Averages leaf water potential(Ψ), osmatic potentials(π) and turgor pressure (P) of natural vegetation of mangrove plants grown along Arabian Gulf. Mean ± S.D., n=5. * = significant at 0-05 %.

Leaf catagories	Water potentials (Ψ) Mpa	Osmotic potentials (π) Mpa	turgor pressure (P) Mpa
Expanding	-5.35±1.37	-6.19±1.62	0.84±.08
Fully expanded	-4.31±1.2	-5.29±1.43	0.98±.09
F. Test	*	*	*

The high Na and Cl concentration in fully expanded leaves compared with expanding leaf tissues indicate that these ions are the main solutes which contributes to decreasing the leaf osmotic potential of expanding leaves suggests that ions may not provide adequate solute for osmotic adjustment in this leaf category.

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