

ELEMENTAL ANALYSIS OF MANGROVES BY E. D. S. METHOD

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ABSTRACT

Attempts were made during present research work to differentiate between true mangroves and mangrove associates, on the basis of chemical analysis following Energy Dispersive Spectroscopy (EDS), wherein Nitrogen, Calcium, Magnesium, Potassium, Sodium and Chloride were analyzed. The K/Na ratio determines the Mangrove groups – true mangrove and mangrove associates.

Keywords: Elemental analysis, True Mangroves, Mangrove associates, Energy Dispersive Spectroscopy (EDS), K/Na ratio.

Introduction

Mangroves are shrubs or small trees growing in coastal, saline or brackish water in tropical and subtropical region. True Mangroves are highly adapted to the intertidal zone growing in tidal edges. Those are submerged in saline water. On the other hand Mangrove associates grow nearby the tidal periphery of mangrove habitats (Santisuk 1989).

True mangroves show higher salt tolerance, with optimal growth under moderate salinity (Parida and Das, 2005) with accumulation of inorganic ions for osmotic adjustment (Ueda *et al.*, 2003). As mangroves are associated with other plants, present investigation was undertaken to find out the differences between true Mangroves and mangrove associates on the basis of elemental analysis.

Materials and Methods:

The plants of various species of mangroves and their associates were collected from Gulf of Kachchh, Purna estuary during 2017 -2018 and brought to the laboratory of Department of Botany, Dr.

Babasaheb Ambedkar Marathwada University, Aurangabad Those were properly identified following Flora of Maharashtra (Singh *et al.*, 2001), The plant materials were then thoroughly washed with tap water. Mature leaves and stem portions were shade dried, ground to fine powder, kept in an oven at 55° C till constant temperature, stored in sealed containers and used for analysis.

The Elemental analysis was done at North Maharashtra University, Jalgaon using EDS (Model No. - X Flash Detector 5030 made in Germany) method for the comparative elemental analysis of plants (Ramamurthy and Kannan, 2009).

Results and discussion:

The results obtained have been presented in Tables 1 to 4. The K/Na ratio of true mangroves was < 0.5 indicating their salt tolerance. True mangroves are normally with K/Na < 0.5 ratio (Wang *et al.*, 2010). The K/Na ratio in the leaves of Mangrove associates ranged from 1.10 to 18.8, indicating less salt tolerance and confirmed as mangrove associates.

Table 1: Elemental analysis of true Mangroves leaf
(The values are expressed as per cent on dry weight basis)

Sr. No.	Name of Species	N%	Ca%	Mg%	K%	Na%	Cl%	K/Na%
1	<i>Avicennia marina</i> (Forssk.) Vierh.	1.28	0.93	0.16	0.57	1.16	2.88	0.49
2	<i>Avicennia alba</i> Blume	1.07	0.10	1.23	0.35	4.12	1.97	0.08
3	<i>Acanthus ilicifolius</i> L.	1.86	0.28	0.25	0.71	2.82	1.86	0.25
4	<i>Aegiceras corniculatum</i> (L.) Blanco.	0.59	0.10	0.83	0.46	3.81	1.56	0.12
5	<i>Bruguiera gymnorrhiza</i> (L.) Lam.	1.50	1.63	0.01	1.18	2.90	3.12	0.40
6	<i>Bruguiera cylindrica</i> (L.) Blume	2.50	1.12	0.78	1.84	2.30	3.94	0.78
7	<i>Ceriops tagal</i> (Perr.) C. B. Rob.	1.42	0.29	0.07	0.23	3.12	1.62	0.07
8	<i>Rhizophora mucronata</i> Lam.	1.36	0.65	0.41	0.54	3.15	3.00	0.17
9	<i>Sonneratia apetala</i> Buch.-Ham.	1.11	0.56	0.68	0.45	1.20	2.21	0.37

Table 2: Elemental analysis of Mangroves Associates leaf
(The values are expressed as per cent on dry weight basis)

Sr. No.	Name of Species	N%	Ca%	Mg%	K%	Na%	Cl%	K/Na%
1	<i>Aeluropus lagopoides</i> (L.) Thwaites	1.18	0.20	0.15	1.48	0.27	2.43	5.48
2	<i>Derris trifoliata</i> Lour.	0.59	3.26	0.58	2.38	0.21	1.25	11.33
3	<i>Ipomoea pes-caprae</i> (L.) R. Br.	2.31	0.63	0.29	3.32	0.91	2.41	3.64
4	<i>Porteresia coarctata</i> (Roxb.) Tateoka	1.60	0.66	0.30	3.01	0.57	2.64	5.28
5	<i>Salvadora persica</i> L.	1.41	0.54	0.51	1.22	1.10	3.73	1.10
6	<i>Sesuvium portulacastrum</i> (L.) L.	0.08	0.45	0.19	2.20	1.01	1.01	2.17
7	<i>Suaeda maritima</i> (L.) Dumort.	4.27	0.38	1.13	1.26	1.09	0.06	1.15
8	<i>Thespesia populnea</i> (L.) Sol. ex Correa	6.64	1.18	0.20	2.07	0.11	0.65	18.81
9	<i>Volkameria inermis</i> L.	0.57	0.85	0.70	0.99	0.81	3.75	1.22

Table 4: Element analysis of Mangrove associates stem
(The values are expressed as per cent on dry weight basis)

Sr. No.	Name of Species	N%	Ca%	Mg%	K%	Na%	Cl%	K/Na %
1	<i>Derris trifoliata</i> Lour.	0.08	0.45	0.19	2.20	1.01	1.01	2.17
2	<i>Ipomoea pes-caprae</i> (L.) R. Br.	4.74	1.20	0.04	0.19	0.11	0.15	1.17
3	<i>Salvadora persica</i> L.	1.02	1.64	0.09	1.17	0.36	1.12	3.25
4	<i>Thespesia populnea</i> (L.) Sol.ex Correa	3.01	1.02	0.06	0.40	0.09	0.13	4.44
5	<i>Volkameria inermis</i> L.	2.75	1.01	0.23	0.25	0.52	0.53	0.48

The K/Na ratio in the stems of true mangroves ranged from 0.02 to 0.45 in various species under investigation (Table 3) which confirmed their salt tolerance. On the other hand this ratio was from 0.48 to 4.44 in the plants associated with them (Table 4). All species of true mangroves showed significantly higher Na and Cl contents than mangrove associates, as also reported by Wang *et al.*, (2010).

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