

Cell Viability and Leakage of Electrolytes in *Avicennia germinans* Exposed to Heavy Metals

Daniel Gonzalez-Mendoza^{a,d,*}, Adriana Quiroz-Moreno^b, Rosa Escobedo Gracia Medrano^c, Onecimo Grimaldo-Juarez^a, and Omar Zapata-Perez^d

^a Instituto de Ciencias Agrícolas de la Universidad Autónoma de Baja California (ICA-UABC), Carretera a Delta s/n C.P. 21705, Ejido Nuevo León, Baja California, Mexico. E-mail: daniasaf@gmail.com

^b Unidad de Biotecnología, CICY, Merida, Yucatan, Mexico

^c Biología Molecular, CICY, Merida, Yucatan, Mexico

^d Departamento de Recursos del Mar, Cinvestav Unidad Merida, Merida, Yucatan, Mexico

* Author for correspondence and reprint requests

Z. Naturforsch. **64c**, 391–394 (2009); received September 18/December 4, 2008

The effect of heavy metal stress on the cell viability and leakage of electrolytes of *Avicennia germinans* leaf discs was investigated by the tissue tolerance test. Foliar discs were incubated with different Cd^{2+} or Cu^{2+} concentrations for 24 h; thereafter, the cell membrane stability of the tissue was assayed by the cell viability Evans blue and leakage electrolytes methods. The results indicated that electrolyte leakage of the leaf discs increased 24 h after exposure to heavy metal stress, as shown by a reduction of the cell viability by 30% in discs exposed to higher doses of Cd^{2+} (0.546 M) and Cu^{2+} (0.7 M), respectively. Additionally, the histological analysis of the leaf discs exposed to heavy metal stress revealed that at higher Cd^{2+} and/or Cu^{2+} concentrations an increase in the intercellular spaces and destruction of mesophyll cells was observed 24 h after exposure. In summary, the biochemical and structural changes observed in foliar tissues of *A. germinans* suggest that higher cadmium and copper concentrations may result in structural changes and altered physiological characters in leaves.

Key words: *Avicennia germinans*, Cadmium, Copper, Cell Viability