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The Bioaccumulation of Heavy Metal Lead in Two Mangrove Species (*Rhizophora apiculata* and *Avicennia alba*) by The Hydroponics Culture.

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Abstract

The bioaccumulation of lead (Pb) at varying salinities by two species of mangrove, *Avicennia alba* and *Rhizophora apiculata* was studied under hydroponic cultivation. The two mangrove species were chosen as they are known to have different mechanisms in controlling accumulation of sodium where *Avicennia alba* regulates it through its salt glands while *Rhizophora apiculata* limited the transport of the salt to the shoot by some mechanism located in the root systems. The plants were grown in salinities of 0, 15 and 30 ‰ and Pb concentrations of 0.03, 0.3 and 3 mg/l. It was observed that for both species, the amount of Pb detected in the leaves was significantly lower than in the roots. In *A. alba* the concentration of the metal in the roots is about 8 times higher than the concentration in the leaves whereas in *R. apiculata* it can be as high as 17 fold. This gives the impression that Pb moves to the leaves more easily in *A. alba* and this may be related to the presence of the salt glands. This is further supported by the fact that the highest Pb absorption in the leaves of *A. alba* was found in the highest salinity exposure. To further substantiate this fact, highest Pb concentration in the roots was detected at 0 ‰ salinity and highest metal exposure.

Key word: *bioaccumulation, Lead, Rhizophora apiculata, Acivennia alba.*

The Bioaccumulation of Lead in Two Species of Mangrove (*Rhizophora apiculata* and *Avicennia alba*) Grown Hydroponically

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Some special characteristics of mangrove:

- Found in estuaries in tropical and subtropical areas;
- Act as sink and buffer zone for coastal pollution;
- High sedimentation and organic content;
- Plants have different mechanisms for heavy metal uptake:
  - ✓True exclusion
  - ✓Shoot exclusion
  - ✓Accumulation

Adaptations of mangrove trees to the saline conditions:

➢Salt resistant species, which have special structure to keep salt out effectively and avoid absorbing too much salt, like the species in the family Rhizophoraceae.

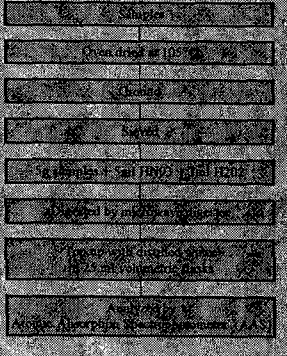
➢Salt secreting species, which can excrete salt from salt glands after absorbing some salt from outside, such as species in genus Aegiceras, Avicennia and Acanthus.

Salt crystals on surface of *A. alba* leaves

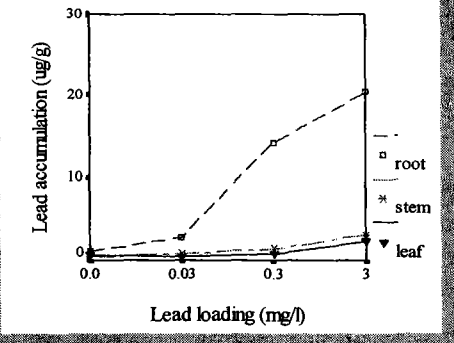
Rhizophora apiculata

Green house treatment of *Avicennia alba*

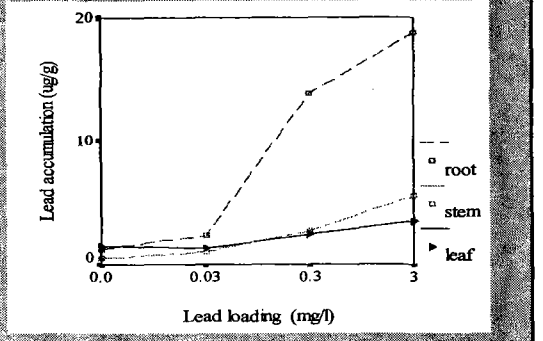
Trace of [lead] in plants



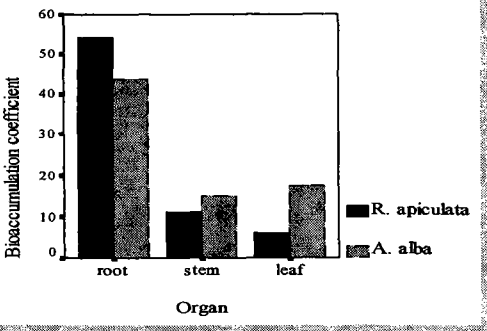
Lead accumulation in *R. apiculata*



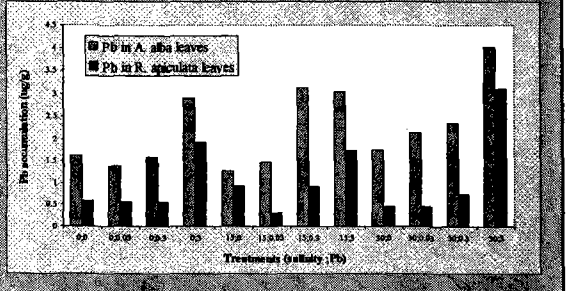
Lead accumulation in *Avicennia alba*



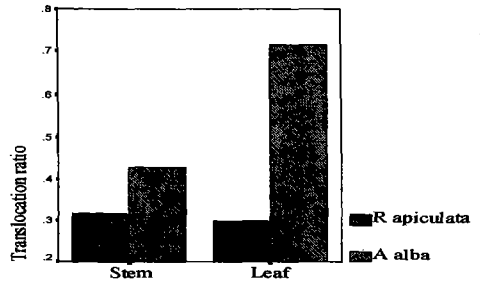
Bioaccumulation coefficient on organs of *R. apiculata and A.alba*



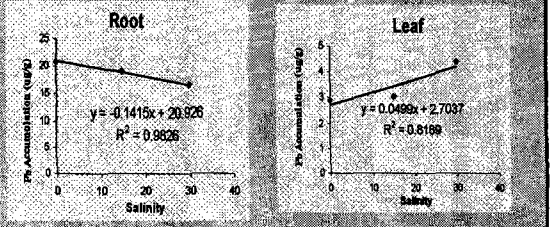
Lead accumulation in leaves of *A.alba* and *R.apiculata*



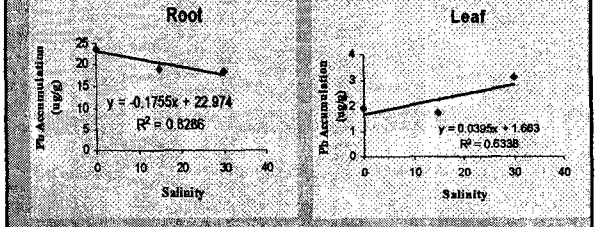
Translocation ratio on stem and leaf of *R. apiculata* and *A. alba*



Influence of salinity on lead accumulation in *A. alba*



Influence of salinity on lead accumulation in *R.apiculata*



Conclusions

- Lead accumulated in the roots of both species.
- Leaves of *A. alba* have higher lead concentration than *R. apiculata*.
- *R. apiculata* restricted lead mobilisation to the shoot while *A alba* have higher mobilisation into the shoot.
- Lead concentration in leaf of *A alba* at salinity of 0 ppt significantly lower than at 30 ppt.