Drinking Water Treatment in the Tropics using Seed Protein Extracts from the Pan-Tropical Tree *Moringa oleifera* Lam.

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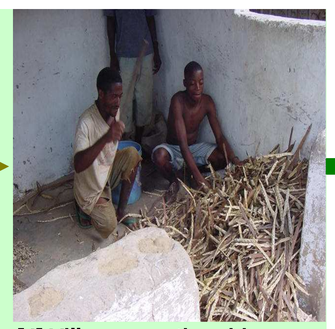
Seeds from the pan-tropical tree *M. oleifera* contain high amounts of water soluble and highly cationic proteins showing the same water clarifying activity as Aluminium sulfate (Alum). Unfortunately, the provision of safe public drinking water in many parts of the developing world heavily depends on Alum which often has to be imported with the scarce foreign currencies available. Interestingly, the Swiss Federal Institute of Technology in Lausanne (EPFL) has developed a robust extraction procedure for a potential production of a low-cost *M. oleifera* bio-coagulant from the seed press-cake following the extraction of a high quality edible oil. A local production of a *M. oleifera* bio-coagulant may thus reduce the dependency on Alum imports particularly in countries of the seasonal dry tropics, where the drought tolerant and multi-purpose Moringa tree is increasingly cultivated as a food- and cash crop.

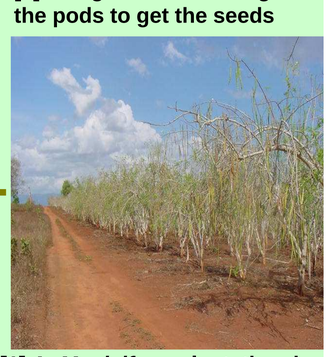
Benefits on the Rural Village Level

[3] Pods containing oleiferous seeds



[4] Village men threshing the pods to get the seeds

[2] A village woman harvesting mature *M.oleifeira* pods



[1] A *M. oleifera* plantation in the coastal zone of Tanzania

The processing of *M. oleifera* seed products may **create employment opportunities** in urban areas in countries of the seasonal dry tropics, which are among the poorest in the world.

The promotion of the drought tolerant tree as a food- and cash crop may contribute to **poverty alleviation and rural development** in drought ridden countries such as Tanzania, where crop cultivation is limited by unpredictable annual rainfalls.

Benefits on the Urban Industrial Level

[5] Mature *M. oleifera* seeds contain an edible oil (~ 40%)

seed oil

the primary product is used:

- **as an edible oil**
- **as a lubricant**
- **in Pharmaceutical Industries**
- **in Cosmetic Industries**

Residual Seed Cake

after bio-coagulant extraction can be used:

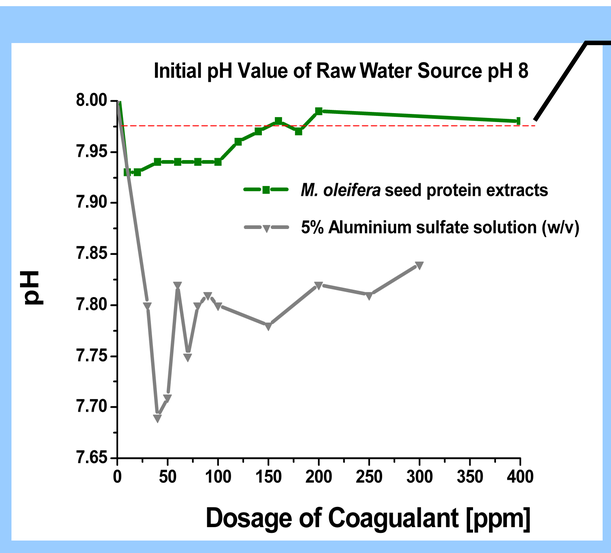
- **as a soil fertilizer**
- **as an animal food supplement**

[6] Defatted *M. oleifera* seed press-cake

Significance of the Project:

The use of a locally available and producible *M. oleifera* bio-coagulant in stead of Alum may contribute to cost-effective, self-dependent yet high quality drinking water treatment in countries which are coincidentally among the poorest in the world. An established local industry processing *M. oleifera* seed products may additionally enhance economic development on both, rural community- and urban industry level.

Benefits on National Level: A Reduced Dependency on Imports of Aluminium Sulfate (Alum)



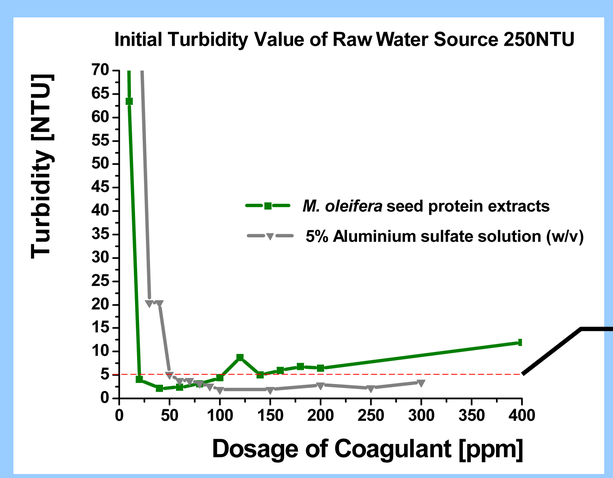
Unlike Alum, *M. oleifera* seed protein extracts do not affect pH in treated drinking water. The use of the bio-coagulant in water treatment processes in tropical countries may thus reduce public expenditures for the purchase of Alum and additives necessary for pH adjustment.

[8] Conventional Water Treatment plants make heavy use of inorganic coagulants such as Alum which have to be imported using foreign currency

[7] Surface water such as rivers are a frequent source for drinking water in many parts of the developing world

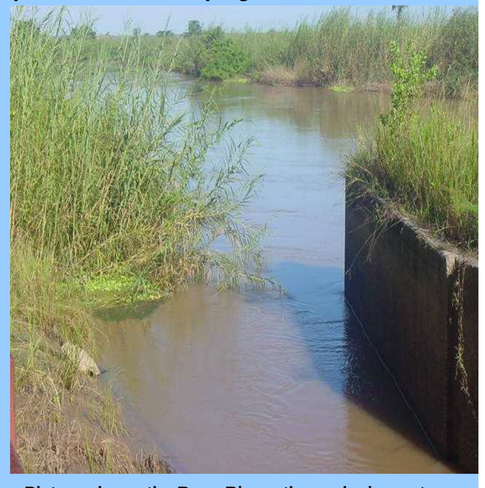
[11] A girl collecting treated water from a public stand post

[10] A conventional water treatment plant



According to the World Health Organization (WHO) 5NTU is the limit of acceptance for the occurrence of turbidity in drinking water in developing countries. High turbid water (i.e. 250NTU) can be clarified to this WHO limit using only 20ppm of *M. oleifera* seed protein extracts.

[9] *M. oleifera* seed protein extracts contain highly cationic polypeptides which act as a natural coagulant



Picture shows the Ruvu River, the exclusive water source for 3 Mio. people in the city of Dar es Salaam, Tanzania

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