

Salinity Management

A photograph of a coastal agricultural field. The foreground shows a small pond with water and some floating vegetation. The field is divided into rows of crops, including what appears to be a row of white flowers or small plants. The background features a line of trees under a blue sky with some clouds.

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How does salinity problems occur?

- Sub-surface water recharge
 - ✓ Topography of Mauritius
 - ✓ Geological canals
 - ✓ High rainfall → fresh water predominates
 - ✓ Low rainfall → less fresh water
- Sea water intrusion
 - ✓ During high tides
- During drought periods → acute salinity condition

What is irrigation water quality?

- Irrigation water quality is related to the amount of dissolved salts
- Origin: leaching of minerals and saline water table
- Water quality depends on the following physical and chemical parameters:
pH, Electrical conductivity (Ec), Chloride, Nitrate; Sodium, Calcium & Magnesium (used to calculate SAR); Bicarbonate, Sulphate and Potassium

Guidelines for interpreting IWQ

Parameters	Maximum Limit
pH	5.0-9.0
Electrical Conductivity (microSiemens/cm)	2000
Chloride (mg/l)	250
Nitrate-Nitrogen (mg/l)	15
Sodium Absorption Ratio	6

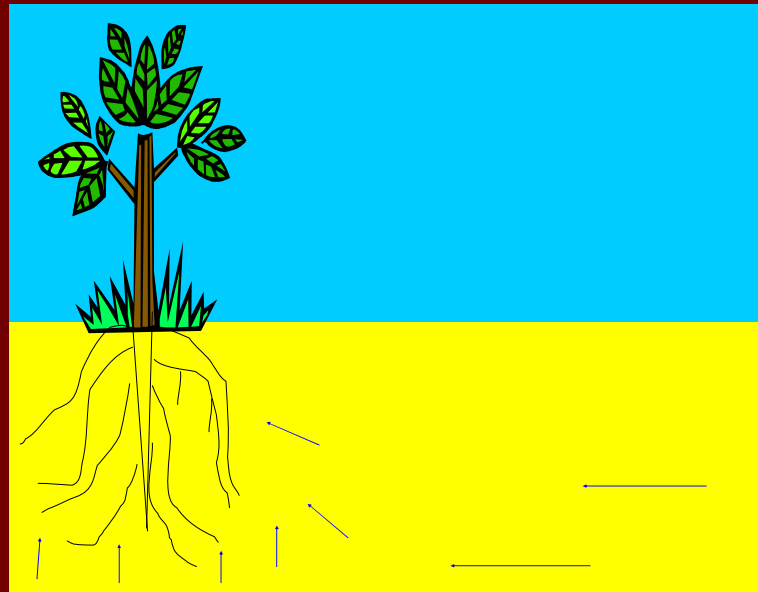
Source: Ministry of Environment, according to the FAO

Effects of low quality irrigation water on crop production

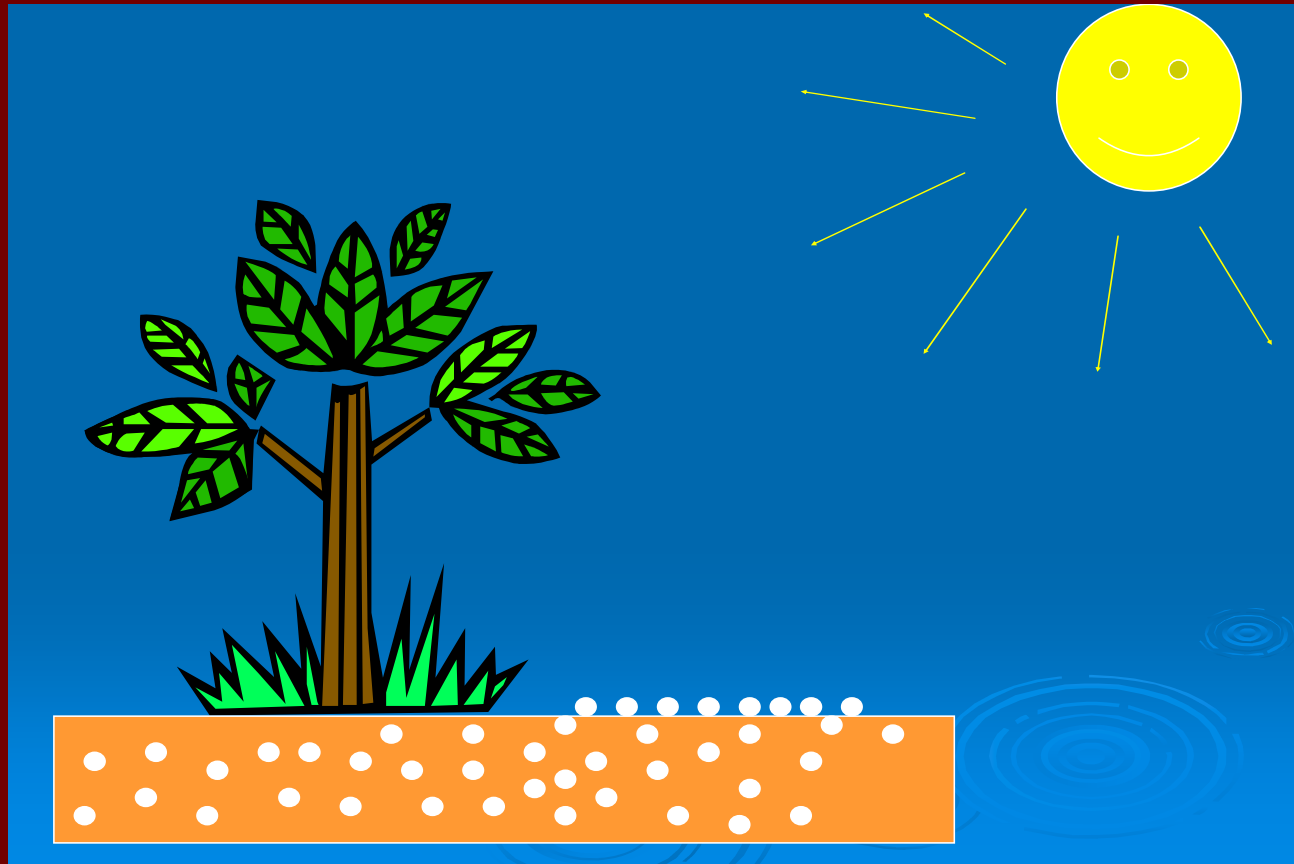
- Leaf burning by sprinkler irrigation
- Salt accumulation - Water taken up by crops and also evaporates from soil surface
- Presence of salts in soil
 - ✓ Reduce water availability to crop
 - ✓ Ions taken up and accumulate to high conc. (toxicity problems, crop failure)
 - ✓ Reduce infiltration (Water & oxygen stress)

Causes of salinity problems

- ✓ Irrigation with saline water
- ✓ Upward movement of saline water in soil



- ✓ High evaporation from soil surface
 - Salt accumulation in soil
 - Salt accumulation on soil surface



Effects of salinity on crop production

- Salt in soil
 - ✓ Water cannot move into the plant via the roots
 - ✓ Ions taken up and accumulate to high conc.
 - ✓ Reduce infiltration (Water & oxygen stress)
 - ✓ Crop wilts
 - ✓ Reduced yield
- Irrigating with saline water
 - ✓ Leaf burn and crop losses

Areas at risks in Mauritius



IAEA project 2003-2005

- Severe onion crop failure was noticed at Trou D'Eau Douce in 1999
- The water source used was borehole, with sprinkler irrigation system for irrigation
- A project was started in 2003 with one of the objectives of studying the irrigation water quality
- Collaboration with the IAEA

Activities Covered

1. Assessing the irrigation water quality

- Water samples collected every 2 weeks
- Chemical analysis at AREU & MOA



2. Measurement of water table





3. Measurement of salt level in soil



Results

- **Level of salinity varies across the year**
- **Salinity level in water and soil is high during period of drought**
- **Water table level is high and is near root zone**
- **Sea water intrusion occurs frequently**

Salinity Management Practices

1. Measurement of salinity level

- **Before irrigation**
- **Measure with Ec Meter**
- **Do not irrigate if value greater than 2000**

Crops	Threshold Salinity (MicroSiemens/cm)
Beet	7000
Soybean	5000
Maize	2500
Tomato	2500
Cucumber	2500
Spinach	2000
Cabbage	1800
Potato	1700
Chilly	1500
Lettuce	1300
Onion	1200
Radish	1200
French Bean	1000

2. Growing of salt tolerant crops

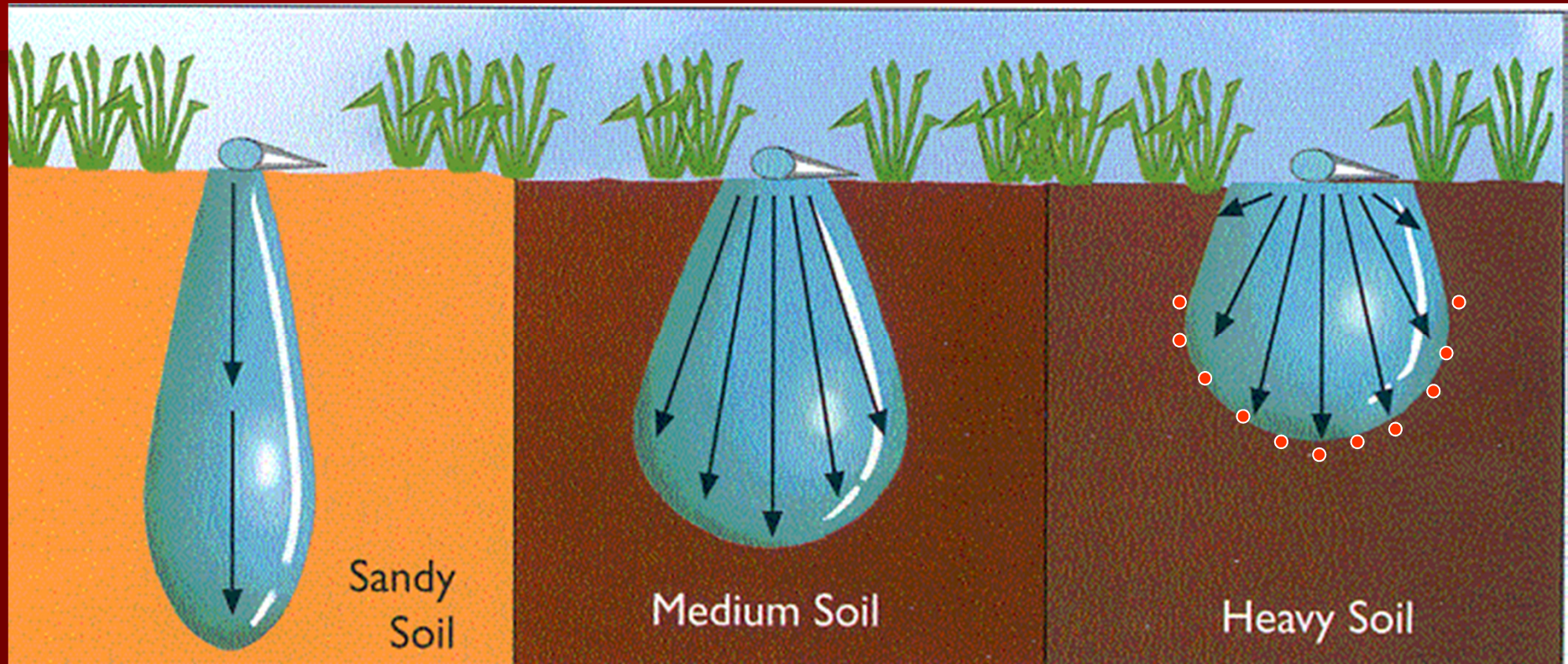
Tolerance	Crops
Tolerant	Asparagus
Moderately Tolerant	Cowpea, Soyabean, Squash, Zucchini, Beetroot, Papaya, Pineapple, Spinach Gladiolus
Moderately Sensitive	Cucumber, Eggplant, Cabbage, Lettuce, Pepper, Potato, Pumpkin, Spinach, Radish, Tomato, Watermelon, Maize, Groundnut, Crucifers, Sweet potato
Sensitive	Bean, Okra, Onion, Carrot

3. Efficient drainage system





4. Drip irrigation system



→ Salt accumulates outside root zone





5. Ploughing of land

- Breaks clods
- Improve infiltration of water



6. Amendments

- **Manure, Scum, Compost, Rock sand, Crop residues**
- **Improve infiltration of water**



7. Raised beds



8. Use of seed trays

- **Sowing in seed trays and transplanting**
- **Prevents seeds damage by salinity**



9. Fertilizer application

- **Split application of fertilizers**
- **Prevents damage to plants**
- **Fertigation via drip irrigation**
- **What is fertigation?**







Support to growers by AREU

- **Analysis of irrigation water and soil samples**
- **Technical support on:**
 - ✓ **novel crops**
 - ✓ **drip irrigation and fertigation**
 - ✓ **mechanisation**
 - ✓ **seedling production**
 - ✓ **drainage**
 - ✓ **soil amendments**

A photograph of a vast grove of date palm trees. The trees are tall with thick, textured trunks and large, feathery fronds. They are arranged in rows, creating a sense of depth. The ground is sandy with some sparse green grass. The sky is a clear, bright blue. Overlaid on the center of the image is the text "Thank You For Your Attention" in a bold, yellow, sans-serif font.

**Thank You
For Your Attention**