Glasswort

<http://sydney.edu.au/science/biology/learning/plant_form_function/mangroves/physiological.shtml>

Plants which grow in areas of tidal influence must be able to deal with environmental extremes not experienced by other plants.

1. **Direct effect of the tide**  
   Plants growing in the lower portion of the tidal range have their root systems covered by water at least twice a day. This usually means that the soil is permanently waterlogged. Land plants obtain oxygen for their root systems to carry out respiration by diffusion through the gas spaces in the soil. Waterlogging displaces air from the soil and effectively prevents this movement. (When a gas space in the soil is filled with water, its capacity to transport oxygen is reduced to 1/300000 of what it was before).
2. **Salinity of water**  
   Most land plants use soil water which contains little salt and which has an osmotic potential which is close to zero. Sea water contains half molar concentrations of sodium and chloride ions and has an osmotic potential close to -2 MPa. ( If we were to place sea water in an osmometer fitted with a semi-permeable membrane in contact with pure water, the pure water would move into the osmometer. If pressure was then applied to the sea water and progressively increased, the pure water would cease entering sea water compartment when the pressure reached 2 MPa - about 20 atmospheres- and water would start to move from the sea water compartment to the pure water if the pressure was further increased.) A normal land plant placed in sea water will loose water to the sea water (and die).
3. **Water for transpiration**  
   Mangroves, being quite large trees, require a plentiful supply of water. The water which evaporates from their leaves is pure but the water which is available to their roots contains a large amount of salt. The plant must either have a mechanism which enables it to exclude the salt while absorbing the water or it must be able to rid itself of any excess salt which it takes up. Although measurements of the xylem sap suggest that Avicennia marina excludes about 95% of the salt contained by the water it absorbs, this still means that the plant must have a mechanism to excrete excess salt. Some other mangroves exclude salt so successfully that they do not need this special mechanism.

<https://www.britannica.com/plant/glasswort>

**Glasswort** (genus *Salicornia*), also called**pickleweed**, [genus](https://www.britannica.com/science/genus-taxon) of about 30 species of [annual](https://www.britannica.com/science/annual) succulent herbs in the amaranth family ([Amaranthaceae](https://www.britannica.com/plant/Amaranthaceae)). Native to [salt marshes](https://www.britannica.com/science/salt-marsh) and beaches around the world, glassworts are halophytic plants that accumulate salts in their leaves and stems as an [adaptation](https://www.merriam-webster.com/dictionary/adaptation) to their saline [habitats](https://www.britannica.com/science/habitat-biology). The ashes of dried, burnt glassworts contain large amounts of [potash](https://www.britannica.com/science/potash) and were formerly used in glassmaking. Several species, including samphire (Salicornia europaea) and umari keerai (S. brachiata), are edible and can be eaten raw or cooked.

<http://www.ecomare.nl/en/encyclopedia/organisms/plants/flowering-plants/goosefoot-family/salicornia/>

Being a halophyte not only means it tolerates salt water, it won't even grow without salt in the soil. Its roots take up seawater, storing the salt in its leaves. However, there is a limit. Too much salt disrupts growth. In order to extend its life, it reduces the salt intake as much as possible by using as little water as necessary.

Salicornia leaves have a thick skin and a limited surface area, which counteract evaporation. Furthermore, an oxygen layer forms around its roots making it difficult for harmful metals and too much salt to penetrate the plant. The excess salt is stored in the oldest (lowest) leaves as much as possible, which eventually die off. The saturated leaves turn yellow or even red while the top of the plant can still have a healthy green color. Annual seablite displays this same adaptation.