1. Salt stress and tolerance mechanisms

(in co-operation with Prof. Dortje Golldack, University of Bielefeld, Germany, Dr. Md Abdul Kader, Bangladesh Agricultural University, Bangladesh, Prof. Karl Mühling, University of Kiel, Germany, and Prof. Sven-Erik Jacobsen, University of Copenhagen, Denmark )

A project on physiological, biochemical and molecular responses of plants to salinity stress started in 2003. In this project the sodium uptake mechanisms in salt-tolerant and salt-sensitive species were studied by use of a new fluorescent dye, specific for sodium, SBFI. In rice we have shown that sodium must enter into the cytosol before a calcium signal is obtained, and that, therefore, the sensor of sodium should be situated inside the plasma membrane. We have also investigated the transporter genes for sodium transport through the plasma membrane and tonoplast. So far we have found that the expression of OsHKT1, OsHKT2 and OsVHA are differently regulated in tolerant and sensitive rice cultivars, but other transporter genes might also be important. The main aim is to fully understand the salt tolerance mechanisms and to identify the sensor for sodium. This knowledge is necessary for transferring high salt-tolerance into high-yielding rice cultivars.

Rice is often subjected to salinity

In a project on salt stress in wheat we have compared 2 cultivars differing in sensitivity to this stress. We found that salt treatment induces an increase in cytosolic pH only in the more tolerant cultivar and that an extra calcium supply during cultivation prevents sodium uptake up to 50 mM Na in the medium. We are also investigating plasma membrane H^+ATPase activities in the 2 cultivars. A doctoral student Sherif Morgan is involved in this project.

A new project concerning salt stress and tolerance mechanisms in quinoa started 2012 in cooperation with Sven-Erik Jacobsen, University of Copenhagen. Quinoa (Chenopodium quinoa Willd.) is a halophyte, originally from South America. This crop
is tolerant to drought, frost, and saline soils. It contains many essential amino acids and is gluten free, and is, therefore, used in organic farming. Quinoa has been selected by FAO as a suitable crop to secure food in the 21st century. However, little information is available about its tolerance mechanisms for salinity. A doctoral student Yujie Sun is involved in this project.

We also have investigated salt stress signaling in another halophyte, quince, *Cydonia oblonga* cv. Mill, which can be used as a root-stock for salt-sensitive species, such as pear trees.

![Quince](image)

*Quince, Cydonia oblonga* cv. Mill a halophyte

The 2 last projects are part of the European COST Action FA0901: Putting Halophytes to Work - From Genes to Ecosystems, in which I am a MC member.

Publications within this project


