



Prof.
MURATA Yoshiyuki



Study on the molecular mechanisms that regulate environmental stress responses in plants

In nature, plants are exposed to a combination of a wide variety of environmental stresses. To sustain their growth, plants have developed robust mechanisms that integrate the stress signals and then output the optimal adaptation response. The long-term goal of our research is to uncover the molecular mechanisms of how plants achieve the signal integration and its conversion to the downstream response. In particular, our research focuses on stress signaling regulating stomatal movement. Stomatal pores, which are formed by pairs of guard cells in the epidermis especially of leaves, regulate gas exchange for photosynthesis and transpirational water loss. Guard cells can perceive various stimuli such as light, CO₂, pathogen infection, and various phytohormones such as abscisic acid, jasmonate, and salicylic acid, then transducing the inputs to a change in stomatal aperture. Using multidisciplinary approaches, we aim to reveal the detailed mechanisms of signaling cascading from stress sensing to stomatal aperture regulation in guard cells. We also study the basic mechanisms of heavy metal and salt stress responses in plants using model plants as well as cultured cells. Our research advance will contribute to develop new technologies that improve crop productivity and safety.

