The role of mitochondrial energy metabolism in driving and regulating germination

Markus Schwarzländer, Thomas Nietzel, Dennis Brandt

Institute of Plant Biology and Biotechnology, University of Münster, Schlossplatz 8, 48143 Münster, Germany

Seeds allow propagation over long distances and time periods, and provide protection of progeny from hostile environments, such as cold or drought. The ability of an orthodox seed to preserve a preformed embryo in a quiescent state and to rapidly re-activate it when the conditions are favorable represents a remarkable ability of seed plants.

During germination the embryo relies on the energy stores within the seed. Their rapid mobilization to provide the ATP that the cells require for efficient germination is strictly dependent on the mitochondria in most species. While mitochondrial metabolism must be largely inactive during quiescence to preserve resources, activation of germination necessitates a sharp and rapid kick-start. We have been investigating two factors that underpin the efficiency of this process: the mitochondrial thiol redox machinery and protection by Late Embryogenesis Abundant (LEA) Proteins.

Using *in vivo* redox sensing, we found that thiol redox status is re-established very early in germination. We have used thiol redox proteomics generating a *thiol-switch-ome* that is endogenously operated in mitochondria. We have further been investigating the roles of organellar LEA proteins in managing a smooth transition between quiescence and activation of mitochondrial respiratory metabolism. I will discuss our current insight into the specific role of regulating mitochondrial function to support seed germination.