



"Oxygen sensing and signaling in plants"

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Plant life is greatly impaired under conditions of oxygen deficit. The majority of eukaryotic organisms rely on molecular oxygen for respiratory energy production. When the supply of oxygen is hampered, a variety of acclimation responses is activated to reduce detrimental effects of energy depletion. In plants, one branch of the ubiquitin-dependent N-end rule pathway for protein degradation, which is active both in mammals and plants, functions as an oxygen sensing mechanism. A conserved N-terminal amino acid sequence of the ERF-transcription factor RAP2.12 is dedicated to an oxygen-dependent sequence of post-translational modifications, which ultimately leads to degradation of RAP2.12 under aerobic conditions. The modification that triggers this pathway is catalyzed by a plant-specific class of Cysteine Oxidases that incorporates molecular oxygen into cysteine to generate a sulfinic-acid adduct. When the oxygen concentration is low, RAP2.12 accumulates in the nucleus to activate the gene expression program for hypoxia acclimation. The discovery of an oxygen sensing mechanism in plants opens up new possibilities to improve flooding tolerance in crops.