

# Oxygen and ROS/redox as regulators of bud development and dormancy in grapevine

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## **Abstract**

Grapevine (*Vitis vinifera* L.) displays wide plasticity to climate, expressed through the decisions of the axillary perennating bud to grow or quiesce. The bud complex is a multi-meristematic structure that develops physical and physiological boundaries, which contribute to establish an internal environment for ROS/redox and oxygen tension (hypoxia) to play key roles in regulating growth of the meristems. We have applied physiology, histology, tomography, cell cycle, gene expression, biochemical and morphometric toolsets to investigate the roles and regulation of ROS/redox and hypoxia network components through the discrete transition of bud burst as well as the diffuse transitions of bud dormancy. We are able to provide several examples of where these signalling networks play important roles to integrate environmental cues that regulate the decisions to grow or quiesce. We have also developed hypotheses for the roles of key redox couples ascorbate and glutathione in regulating perennial plant phenology. Further research in model and applied systems will lead to a greater understanding of the interface between environmental cues and plant growth in complex systems.