

Regulation of nitric oxide by phytohemoglobins

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Phytohemoglobins (a.k.a. plant hemoglobins) are present in all known plant genomes. Three classes (1 to 3) of phytohemoglobins have been identified. Functions of the class 3 type are mostly unknown, whereas the class 1 and 2 phytohemoglobins have been associated with modulation of nitric oxide (NO) in developmental processes and in stress responses in different plant species. Under normoxic conditions the gene expression pattern of phytohemoglobins is related to cell- and tissue-specific regulation of NO levels in responses to different environments and developmental stages. However, during hypoxic stress conditions class 1 phytohemoglobin gene expression is highly upregulated in all plant tissues, where phytohemoglobin plays a role in reducing nitrogen loss through NO emission. NO is a central molecule in the distinct signaling pathways of the responses towards necrotrophic or biotrophic pathogens, and phytohemoglobin gene overexpression or gene silencing interferes with progression of infections in very different types of plant-pathogen interactions in a pattern related to modulation of NO levels.

References

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