Title: Reactive oxygen species, oxidative signaling and the regulation of photosynthesis

Author: Christine H. Foyer

PII: S0098-8472(18)30549-5
DOI: https://doi.org/10.1016/j.envexpbot.2018.05.003
Reference: EEB 3440

To appear in: *Environmental and Experimental Botany*

Received date: 11-4-2018
Revised date: 3-5-2018
Accepted date: 3-5-2018

Please cite this article as: Foyer, Christine H., Reactive oxygen species, oxidative signaling and the regulation of photosynthesis.Environmental and Experimental Botany https://doi.org/10.1016/j.envexpbot.2018.05.003

Reactive oxygen species, oxidative signaling and the regulation of photosynthesis

Christine H. Foyer

Centre for Plant Sciences, School of Biology, Faculty of Biological Sciences, University of Leeds, LS2 9JT, United Kingdom.

Corresponding author: Christine H. Foyer, c.foyer@leeds.ac.uk;

Highlights

- Reactive oxygen species (ROS) are produced in abundance by photosynthesis.
- ROS and antioxidants function in redox signal transduction that is important in chloroplast to nucleus communication.
- Some chloroplasts have specialized signaling functions that regulate epigenetic as well as genetic programming.
- Photoinhibition and slowly reversible decreases in photosynthetic capacity are not necessarily the result of light-induced damage to PSII reaction centers.

Abstract:

Reduction-oxidation (redox) reactions, in which electrons move from a donor to an acceptor, are the functional heart of photosynthesis. It is not surprising therefore that reactive oxygen species (ROS) are generated in abundance by photosynthesis, providing a plethora of redox signals as well as functioning as essential regulators of energy and metabolic fluxes. Chloroplasts are equipped with an elaborate and multifaceted protective network that allows photosynthesis to function with high productivity even in resource-limited natural environments. This includes numerous antioxidants with overlapping functions that provide enormous flexibility in redox control. ROS are an integral part of the repertoire of chloroplast signals that are transferred to the nucleus to convey essential information concerning redox pressure within the electron transport chain. Current evidence suggests that there is specificity in the gene-expression profiles triggered