



## Reactive oxygen species and antioxidant defense in plants under stress

### Guest Editor



**Prof. Dr. Mirza Hasanuzzaman**

[mhzsauag@yahoo.com](mailto:mhzsauag@yahoo.com)

Department of Agronomy, Sher-e-Bangla Agricultural University, Bangladesh

**Expertise:** Plant Physiology, Agronomy



**Prof. Dr. Masayuki Fujita**

[fujita.masayuki@kagawa-u.ac.jp](mailto:fujita.masayuki@kagawa-u.ac.jp)

Faculty of Agriculture, Kagawa University, Japan

**Expertise:** Plant Biochemistry

### Message from the Guest Editor

Dear Colleagues,

As a sessile organism plants are frequently suffer from various stresses. One of the major consequences of stresses are oxidative stress due to excess generation of reactive oxygen species (ROS). In a biological perspective, ROS are formed as a natural byproduct of the normal aerobic metabolism of oxygen and have important roles in cell signaling and homeostasis. It has been produced in cell during respiration and photosynthesis and important for the succession of different biological processes such as cellular proliferation and differentiation. On the contrary, under different environmental stresses plants become unable to maintain proper balance of redox state and cause overproduction of ROS. Along with several free radicals ( $O_2^{\cdot-}$ ,  $\cdot OH$ ,  $RO^{\cdot}$ , and  $ROO^{\cdot}$ ), some non radicals ( $H_2O_2$ ,  $^1O_2$ , and  $O_3$ ) are also specified as cellular ROS. However, the over-generated ROS in different cell compartment including chloroplast, mitochondria, peroxisomes and plasma membrane causes oxidative stress through lipid peroxidation, nucleic acid and protein damages, modulation of carbohydrate metabolism and ultimately cell dysfunction and cell death. In plant cells, different antioxidants play a vital role in keeping the proper balance between ROS generation and elimination through direct or indirect scavenging of ROS. Antioxidant defense system is consisted of a number of non-enzymatic antioxidants namely ascorbate (AsA), glutathione (GSH),  $\alpha$ -tocopherol, phenolic compounds (PhOH), flavonoids, alkaloids, and nonprotein amino acids work in a coordinated fashion and several antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), peroxidase (POX), polyphenol oxidase (PPO), ascorbate peroxidase (APX), monodehydroascorbate reductase (MDHAR), dehydroascorbate reductase (DHAR), glutathione reductase (GR), glutathione peroxidase (GPX), glutathione S-transferase (GST) to mitigate overgeneration of ROS. Antioxidant defense capacity in plants varies with the plant species and genotypes stress types and duration. In the last few decades a lot of progress has been made in understanding the ROS biology and oxidative stress in plants under abiotic and biotic stress. This special issue will host such progress. Both research and review articles are welcome.

Prof. Dr. Mirza Hasanuzzaman and Prof. Dr. Masayuki Fujita

*Guest Editor*

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Contact us: [Front.Biosci.Landmark@fbscience.com](mailto:Front.Biosci.Landmark@fbscience.com)

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