

## **Roles of Glycinebetaine on Antioxidants and Gene Function in Rice Plants Under Water Stress**

### **ABSTRACT**

Antioxidants activities and gene expression in rice up-regulated during water stress condition. The activation of antioxidants (enzymatic and non-enzymatic) such as glutathione reductase (GR), monodehydroascorbate reductase (MDHAR) and dehydroascorbate reductase (DHAR), catalase (CAT), superoxide dismutase (SOD), ascorbate peroxidase (APX) and glutathione peroxidase (GPX) in plants is related to the Reactive Oxygen Species (ROS) accumulation in plant under stress conditions. Glycine betaine, however, plays a pivotal role as an osmoprotectant in response to water stress. Exogenous application of glycine betaine improves the activities of antioxidants and expression of gene, which might lead to the improvement and sustainability of rice production during climate change conditions. Understanding the association of antioxidant enzyme activities and its expression in response to water stress is essential for further understanding the molecular mechanisms by which controlling antioxidant defense for drought tolerance. This also will be useful information on theory basis for drought resistance breeding and cultivation of rice as an effort to sustain rice production. In this review, literatures for the potential of glycinebetaine to improve antioxidants defense activity and gene expression during the water stress condition in related to sustainable rice production have been discussed.