



*plants*



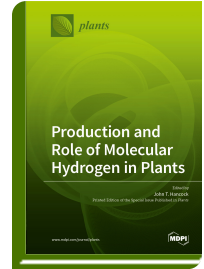
*Special Issue Reprint*

## **Production and Role of Molecular Hydrogen in Plants**

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Edited by  
John Hancock

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Molecular hydrogen (hydrogen gas; H<sub>2</sub>) is gaining prominence in the scientific literature as well as the popular media. Early studies suggest the use of H<sub>2</sub> treatment for a wide range of human diseases, from COVID-19 to various neurodegenerative diseases. Moreover, its biological activity also appears to have therapeutic and regulatory effects in plants. Accordingly, it has been suggested to be useful in agricultural settings.

H<sub>2</sub> has effects on a range of physiological events in plants. It has been shown to have effects on seed germination, plant growth, and development. It has also been found to be involved in plant stress responses and to be protective against abiotic stress. It also has beneficial effects during the post-harvest storage of crops. Therefore, its use in the agricultural setting has great potential as it appears to be safe, with no toxicity or harm to the environment.

One of the conundrums of the use of H<sub>2</sub> is how it induces these effects in plants and plant cells. It is difficult to envisage how it works based on a classical receptor mechanism. There is evidence that it may act as a direct antioxidant, by scavenging hydroxyl radicals, or via enhancing the plant's innate antioxidant system as a signaling molecule. It has also been reported to exert effects through action on heme oxygenase, cross-talk with other signaling molecules, and regulating the expression of various genes. However, how H<sub>2</sub> fits into, and integrates with, other signaling pathways is not clearly understood. Future work is needed to elucidate the mechanism and significance of the interaction of H<sub>2</sub> with these and other cellular systems.



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