

## **Is *Heritiera fomes* Buch. Ham. less adapted to the present conditions of the Indian Sundarbans compared to other mangrove species?**

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### ABSTRACT

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The Sundarbans forest forms one of the largest mangrove vegetation in the Bengal Basin. The name indicates dominance of the tree species *Heritiera fomes* Buch. Ham., locally known as 'Sundari' because of its elegance. Explosive demographic pressure and indiscriminate exploitation of natural resources caused imbalance in this ecosystem. Moreover, reduced fresh water influx and increased sedimentation appeared to be an increasing problem for navigation that in turn, led to elevated soil salinity. In the Indian part of this forest, scarcity of *Heritiera fomes* can be attributed to these manual and environmental adversities. In comparison to the other predominating species in Sundarbans, *H. fomes* is less equipped in its leaf anatomical adaptations and water-use management. Considerably thin cuticle and high stomatal frequency encourage water efflux; whereas, poorly developed water storage tissue and low frequency of terminal tracheioids weaken the water retention mechanism. This inefficiency is reflected well by the transpiration rate and stomatal conductance that continuously increase even beyond 1600  $\mu\text{mol m}^{-2}\text{s}^{-1}$ . In *H. fomes*, assimilation potential declines beyond 1250  $\mu\text{mol m}^{-2}\text{s}^{-1}$  PAR, which unlike the other taxa, can be attributed to the poorly developed palisade tissue and low nitrogen content in leaf. The optimum leaf temperature for photosynthesis is 30°C that is considerably lower than that in the others. Osmotic potential ( $\emptyset$ ) of root and leaf is not low enough to facilitate water uptake from the extremely saline substrate; absence of free proline coupled with low Na<sup>+</sup> content explains the loss of turgidity in

leaf cells. Reduced leaf  $N^+$  may interfere the metabolic processes and hinder synthesis of the compatible solutes to some extent thus renders the species incompatible to the soil and microclimate of western Sundarbans. On the verge of its extinction, these observations can help to chase up suitable strategies to restore the environment for *H. fomes* instead of unplanned plantation and wasting the propagules of this rare species.

Key words: *Heritiera fomes*, mangroves, metabolites, micromorphology, photosynthesis, Sundarbans, water use.

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