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Lysophosphatidic Acid Acyltransferase2 (LPAT2) enhances abscisic acid response and plays a positive role in osmotic stress in rice

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Lysophosphatidyl acyltransferase (LPAT) is a pivotal enzyme controlling the metabolic flow of lysophosphatidic acid into different phosphatidic acids in diverse tissues. Recent results begin to shed light onto the involvement of *LPAT2* in response to ABA, water deficits, and salinity. We examined and characterized putative *LPAT2* gene in rice (*Oryza sativa*). *LPAT2* transcript is existing in all tissues tested with relatively higher in leaves and roots, and was induced by salt, drought and ABA treatment, suggesting its roles in plant growth and stress response. Moreover, *LPAT2* is localized to the endoplasmic reticulum (ER) membrane, implicati-ng its role in lipid metabolism and signaling. Additionally, *LPAT2* might be essential for gametophyte or embryo development as homozygous mutant for a T-DNA insertion in *LPAT2* coding region fails to recover in rice. Using a knockdown mutant *lpat2* and its genetic complementation revealed that *LPAT2* is important for plants to adapt osmotic stress. Reduced *LPAT2* conferred plants and seeds were more sensitive to ABA treatment and were less tolerant to salt and drought stress. The results suggest that *LPAT2* plays a positive role in ABA response and osmotic stress tolerance. The role of *LPAT2* in osmotic stress is mediated by ABA response as shown that the *lpat2* mutant exhibited more water loss from leaves when supplied ABA under salt stress. The ABA responsive gene RAB18 was less induced by ABA and salt treatments in the *lpat2* mutant. The result suggests that *LPAT2* enhance ABA response to promote plants osmotic stress tolerance. PA produced by *LPAT2* activity might be also important for ABA response. PA supplementation is capable of restoring ABA sensing and salt stress tolerance as WT performance. The effects of *LPAT2* on plant stress tolerance might be dual effects of PA, enhanced ABA response and enhanced growth. Our study reveals novel interactions among ABA, *LPAT2* and PA and provides insight into progresses in agronomic traits and adaptive growth through the manipulation of these pathways in rice.

Biography

Alfatih A A Aboagla has completed his MSc from Huazhong Agricultural University, Wuhan, P. R. China. Currently, he is doing his PhD in Microbiology (Bioengineering).

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