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The roles of signal peptide peptidase -like proteases in Arabidopsis thaliana

Sungwon Han, *University of Massachusetts Amherst*

Abstract

The signal peptide peptidases (SPP) are a class of intramembrane cleaving proteases (I-CLiPs) that share very conserved aspartate (GxGD) and PxL domains (QPALLY motif in SPPL) in all eukaryotes. In addition to a role in the disposal of cleaved signal peptides from secretory proteins, human SPP has been proposed to play an important role in viral assembly, ER quality control, immune surveillance and cellular signaling. I have used the facile genetic system of the model plant species, *Arabidopsis thaliana*, to investigate the roles of the SPP family in plants and gain insight into their roles in other eukaryotic systems. Arabidopsis contains six SPP-like genes. I focused the initial studies on AtSPP (AGI:At2g03120), the protein most similar to human SPP. Like human SPP, AtSPP is an ER resident protein. A T-DNA insertion mutant of the *AtSPP* gene, *spp-2*, exhibits a fertility defect that can be traced to a block in pollen germination. The distribution of the male germ unit (MGU) in mature pollen was severely affected in *+spp-2* plants. In addition, *AtSPP* RNAi lines exhibited sucrose dependency in seed germination and reduced root growth in seedlings. Studies with the proherbicide, 2,4-dichlorophenoxybutric acid, indicated that *AtSPP* RNAi lines were defective in beta-oxidation. Based upon the results, I conclude that AtSPP is an ER localized protease that is essential for pollen development and vegetative growth due to a role in regulating lipid metabolism. ^

Subject Area

Molecular biology|Biochemistry|Plant biology

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