

Public Abstract

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Department:Plant, Insect and Microbial Sciences

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Title:IN SILICO STUDY OF LEGUME AND LEGUME-TYPE LECTINS

L-type lectins, initially found in seeds of leguminous plants, are a class of carbohydrate-binding proteins that can specifically recognize various sugar substrates and regulate a multitude of cellular processes. Although many plant L-type lectins have been characterized and known for quite a long time as compared to other plant lectins, their specific and accurate biological function is still unclear and continues to be subject to subsequent and more detailed studies in order to understand their biological role and activity. Little is also known about their distribution across different kingdoms of life, their domain structure, and evolutionary history, as well as their *in vivo* functions. Molecular interactions with ligands other than carbohydrates in plants remain ambiguous, especially under conditions of various biotic and abiotic stresses. In addition, there has been limited, genome-scale analysis of the L-type lectin family; such as, studies of molecular evolution and sub-/neofunctionalization after gene duplication, which is prevalent in this family of land plants. The dissertation research provides an outline of the L-type lectin family, the distribution of its members in different living organisms, their evolutionary relationships, and advances the understanding of plant L-type lectin genes in the context of lineage-specific expansion, with a special focus on land plants and soybean. It also gives insight into their functions in plant growth, development and response to biotic and abiotic stress conditions through a gene ontology enrichment analysis as well as a comprehensive analysis of gene expression profiles of L-type lectin genes in soybean, one of the most important crops widely grown on a global scale. In addition, a modeling and docking study of DORN1 gives a better understanding at the molecular level of the interaction between extracellular ATP and this archetypal receptor in *Arabidopsis* and provides useful information for further studies of plant, extracellular nucleotide receptors.