Evolutionary history of the gibberellin receptor *GIBBERELLIN INSENSITIVE DWARF1* (*GID1*s) family in plants

Rajesh Kumar Gazara, Kanhu Charan Moharana, Daniel Bellieny-Rabelo and Thiago Motta Venancio

Gibberellins are well-known plant growth hormones that control various developmental processes in plants. GIBBERELLIN INSENSITIVE DWARF1 (GID1) is the only known gibberellin receptor in plants. However, several aspects of its evolutionary history in land plants remain unclear. In this study, we systematically identified GID1s from 52 plant species. Our in-depth phylogenetic analysis uncovered the expansion and divergence of GID1s after the origin of angiosperms. We also show the diversification of the GID1 family in two different sub-families GID1ac and GID1b. Further, gene architecture analyses also support the evolution and diversification of eudicot GID1 subgroups from a single ancestor. Multiple sequence alignment and motif identification showed the high conservation of GID1s, as well as specific features of each subgroup, suggesting sites of divergence between. We also performed comparative gene expression analysis of GID1s, which showed that GID1ac and GID1b have both, overlapping and specific functions across plant tissues. Additionally, selection pressure analysis showed GID1b genes have faced strong purifying selection pressure than GID1ac during the course of evolution. Taken together, our data shed light on the natural history of this important hormone receptor family.

Keywords: Gibberellins, GIBBERELLIN INSENSITIVE DWARF1, Land plants

Funding: The authors acknowledge Universidade Estadual do Norte Fluminense Darcy Ribeiro and the following Brazilian funding agencies for their support: Fundação Carlos Chagas Filho de Amparo a Pesquisa do Estado do Rio de Janeiro (FAPERJ), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).