PERCEPTION MECHANISM OF STRIGOLACTONES AND APPROACH FOR AGRICULTURAL PROBLEMS
Tadao Asami, University of Tokyo, Tokyo, Japan

Strigolactones (SLs) are phytohormones that inhibit shoot branching and function in the rhizospheric communication with symbiotic fungi and parasitic weeds. An α/β-hydrolase protein, DWARF14 (D14), has been recognized to be an essential component of plant SL-signaling, although its precise function remains unknown. Here we present the SL-dependent interaction of D14 with a gibberellin (GA)-signaling repressor SLR1 and a possible mechanism of phytohormone perception in D14-mediated SL signaling. D14 functions as a cleavage enzyme of SLs, and the cleavage reaction induces the interaction with SLR1. The crystal structure of D14 shows that 5-hydroxy-3-methylbutenolide (D-OH), which is a reaction product of SLs, is trapped in the catalytic cavity of D14 to form an altered surface. The D14 residues recognizing D-OH are critical for the SL-dependent D14–SLR1 interaction. These results provide new insight into crosstalk between GA and SL signaling pathways. Our model of the SL-perception by D14 explains why a wide variety of natural SLs and analogs can exert their activity as branching inhibitors; the D-ring moiety of SLs is essential for hormonal activity. Our findings would contribute to the development of novel SL analogs and SL-signaling inhibitors for unveiling further details of SL signaling and for controlling plant growth and protecting crops from parasitic weeds in order to increase crop yields.