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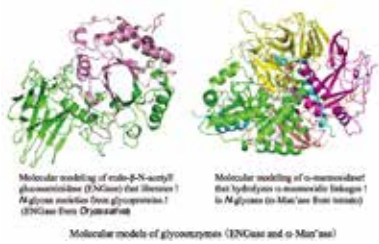
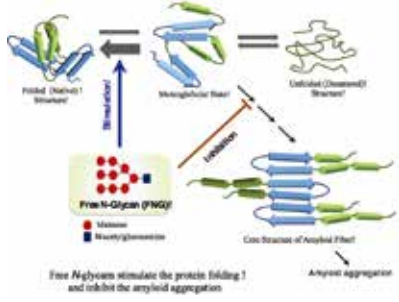
Functional analysis of oligosaccharides involved in plant differentiation, growth, and fruit maturation

In developing hypocotyls, seeds, and fruits at the maturing stage, free N-glycans (FNG) released from glycoproteins or glycopeptides occur at micro molar concentration. We analyze (1) the biofunctions of FNs involved in plant differentiation, growth, and fruit maturation, (2) chaperon-like functions involved in the protein-folding or -refolding mechanism. Based on the unraveled of the biofunctions of FNGs, we aim to establish a new plant biotechnology to control plant differentiation, growth, and fruit-maturation through artificial regulation of the expression of glycogenes (glycosidases, glycosyltrasferases, and glycan-liberating enzymes).



Molecular models of glycoenzymes (ENGase and α-Man'ase)

Analysis of in vivo / in vitro functions of free N-glycans (FNGs) responsible for correct protein folding and refolding



In plant and animal cells or tissues, the liberated asparagine-linked glycans (free N-glycans, FNG) ubiquitously occur. Recently we have found that these FNGs induce the correct protein folding or refolding of denatured or misfolded proteins at millimolar concentration. We analyze the chaperon-like activity of FNGs involved in the protein quality control system working in eukaryotic cells using biochemical and physiochemical strategies. We aim to establish a new concept of glycan function responsible for correct protein folding and apply the chaperon-like function to the development of glycol-reagents stimulating the correct construction of protein 3D structures.