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Insights: Publications

The ram1 Mutant of Arabidopsis Exhibits Severely Decreased ß Amylase Activity

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Despite extensive biochemical analyses, the biological function(s) of plant β-amylases remains unclear. The fact that β-amylases degrade starch in vitro suggests that they may play a role in starch metabolism in vivo. β-Amylases have also been suggested to prevent the accumulation of highly polymerized polysaccharides that might otherwise impede flux through phloem sieve pores. The identification and characterization of a mutant of Arabidopsis var. Columbia with greatly reduced levels of β-amylase activity is reported here. The reduced β-amylase 1 (*ram1*) mutation lies in the gene encoding the major form of β-amylase in Arabidopsis. Although the Arabidopsis genome contains nine known or putative β-amylase genes, the fact that the *ram1* mutation results in almost complete loss of β-amylase activity in rosette leaves and inflorescences (stems) indicates that the gene affected by the *ram1* mutation is responsible for most of the β-amylase activity present in these tissues. The leaves of *ram1* plants accumulate wild-type levels of starch, soluble sugars, anthocyanin, and chlorophyll. Plants carrying the *ram1* mutation also exhibit wild-type rates of phloem exudation and of overall growth. These results suggest that little to no β-amylase activity is required to maintain normal starch levels, rates of phloem exudation, and overall plant growth.