

Synthesis of Phytol Wax Esters in Chloroplasts of Arabidopsis

Felix Lippold, Peter Dörrmann

Institute for Molecular Physiology and Biotechnology of Plants, University of Bonn,
Bonn, Germany

Waxes are esters of fatty acids and primary alcohols. Cuticular waxes play an important role in the impregnation of plant surfaces and, due to their hydrophobic properties, are of high industrial interest. In addition to cuticular waxes which are composed of long chain alcohols and very-long-chain-fatty acids (VLCFAs), there are less prominent wax esters in chloroplasts, i.e. fatty acid phytol esters in the chloroplasts. During senescence or stress, chlorophyll is degraded and the phytol moiety is released from chlorophyll. Because phytol destabilizes biological membranes, it is quickly employed for the synthesis of tocopherol, but also of fatty acid phytol esters. Tocopherol and phytol esters are mostly deposited in the plastoglobules, small lipid protein particles in the stroma of chloroplasts. The enzymes synthesizing phytol esters are unknown in plants. Here, we characterize genes from different acyltransferase families from Arabidopsis with regard to their involvement in fatty acid phytol ester synthesis. Phytol ester formation and composition is analyzed in nitrogen starved, senescent and phytol fed wild type and T-DNA insertion mutant plants via GC-MS.