

Long-chain α,ω -difunctional Fatty Acids from Cutins and Suberins

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Plant surfaces are covered with lipids, both in the form of extractable waxes and polymeric materials. These surface lipids are vital to plants, allowing the control of water-loss and affording insulation against variable environmental conditions. There are two main families of plant surface polymeric lipids: *cutins*, found in leaves and fruits epidermis, and *suberins*, mainly found in outer bark periderms. Typically cutins and suberins are present in small quantities, when reported to surface area or plant weight. However, in a few commercial crops, ton quantities of these polymeric lipids are produced annually, as it is the case of tomato and potato skin, and the corky bark of some trees.

Cutins and suberins are complex biopolyesters based in α,ω -difunctional fatty acids, together with glycerol. Upon depolymerization, they solubilize complex mixtures of monomers. In cutins, C_{16} and C_{18} ω -hydroxyacids are dominant. C_{16} ω -hydroxyacids are found either with saturated chains or hydroxylated close to mid-chain, the later being typically more abundant. C_{18} ω -hydroxyacids are substituted at mid-chain, either with an epoxy group or two vicinal hydroxyls. Suberins monomer mixtures include, together with ω -hydroxyacids, significant quantities of α,ω -diacids and glycerol. In suberins, C_{16} monomers are of smaller importance, with the C_{18} , and sometimes C_{22} , as the dominant chain lengths. C_{18} monomers are found modified at mid-chain, either mono-unsaturated, epoxy or vic-diol substituted. Longer chain C_{22} monomers, both ω -hydroxyacids or α,ω -diacids, have saturated chains.

The reactivity ensured by the di- or poly-functionality of these compounds, together with the properties derived from their long hydrocarbon chains, are promising for polymeric materials, speciality lubricants or to mimic membrane lipids. The eventual availability of these cutin and suberin monomers from plant sources in significant amounts can open the door for a large number of technically interesting and valuable uses.