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Awan, Shahid Iqbal; Clausen, Mads Hartvig

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SYNTHESIS OF BRANCHED–BACKBONE OLIGOSACCHARIDES OF THE PECTIC RG-I PLANT CELL WALL POLYSACCHARIDE

Shahid I. Awan[2], Mads H. Clausen[1,2]

[1] Center for Nanomedicine and Theranostics, [2] Department of Chemistry, Technical University of Denmark, Kemitorvet 207, 2800 Kgs. Lyngby, Denmark.
E-Mail: shia@kemi.dtu.dk

Plants are an essential part of life on earth. They are the primary food producers, climate regulators and provide habitats for other organisms [1]. The dependence of industrialized nations on plant cell walls due to their industrial applications has rapidly increased. Cellulose, hemicelluloses, and pectin polysaccharides are the main structural components of the plant cell wall. Among plant carbohydrates, pectins are highly heterogeneous polysaccharides. They are mainly found in the primary plant cell wall and contribute to various cell functions, including support, defense, signaling, and cell adhesion [2]. Rhamnogalacturonan I (RG-I) is one of the structural classes of pectic polysaccharides, along with homogalacturonan, rhamnogalacturonan II, and xylogalacturonan. The chemical structure of RG-I is complex having a backbone consisting of alternating α-linked L-rhamnose and D-galacturonic acid units with numerous branches of galactan, arabinan, or arabinogalactan positioned at C-4 of the rhamnose residues [3].

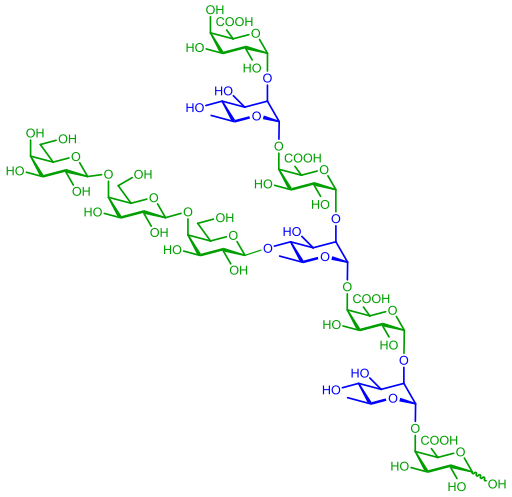

Figure 1. Branched-backbone synthetic target of the pectic RG-I polysaccharide.

The use of defined oligosaccharides rather than isolated polysaccharides can aid in obtaining detailed information about biosynthetic pathways, plant evolution, and agronomical properties. Furthermore, biological testing can provide new insight into plant biology; important for plant preservation, engineering, and utilization of plants as a source of bioenergy. Present work towards defined RG-I substructures involves a [4+3]-coupling to furnish a heptasaccharide backbone unit (see Figure 1). Moreover, installation of side chains of different lengths and nature can be installed at the C-4 position of rhamnose unit. Finally, these oligosaccharides will be deprotected to furnish target molecules to pursue biological studies.

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