EXPLOITING NATURE'S DIVERSITY FOR THE DEVELOPMENT OF CHEMICAL BUILDING BLOCKS

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Renewable resources are getting a lot of attention nowadays since fossil fuel prices are sky high and the reduction of green house gasses is an important ecological and political issue.

Although most attention goes to bio-energy related issues, the development of bio-based materials and chemical building blocks will be essential when fossil fuel reserves continue to decrease. Next to some general aspects, the lecture will focus on three research areas in which our group is active.

The chemical modification of inulin, the reserve polyfructose polymer of chicory, will be described together with the testing and the commercialisation of the derivatives. Inulin carbamates have been produced as an emulsifier with excellent activity in high salt applications. The emulsifier is now being used in cosmetics and has potential in the paint and the polymer industry.

Further, multidisciplinary work on the modification of chitosan will be discussed. Chitosan, the biopolymer prepared from crustaceae waste, has been chemically modified and their fungicidal and insecticidal properties have been studied. The modification has been performed by esterification and reductive amination methods. The modified polymers show promising activity against *Spodoptera littoralis* as a pest insect and show a 10 fold increased fungicidal activity compared to unmodified chitosan.

A third domain which will be described deals with the chemistry of castor oil, extracted from the seeds of *Ricinus communis (Euphorbiaceae)*. Castor oil is rich in triglycerides and is employed directly as crude oil in various industrial fields (coatings, plastics and fibers, detergents, lubricants and others). Ninety percent of the fatty acid content in castor oil is ricinoleic acid, a monounsaturated and hydroxylated 18-carbon fatty acid, a quite uncommon natural fatty acid. Thermal degradation of ricinoleic acid yields undecylenic acid, an interesting renewable building block for organic synthesis. Being interested in discovering green routes to chemicals with a high added value and intermediates for the pharmaceutical industry, our research group has carried out a facile coupling process of undecylenic acid, leading to a twenty-two carbon atom acyloin. The study of its reactivity and its applications is ungoing. Several interesting activities will be presented.