Production of Short-chained Sophorolipids using Specialised Substrates

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Sophorolipids are surface-active glycolipids which are produced by several *Candida* species. As such they are readily biodegradable and can be wholly produced using renewable materials. Currently, the highest productivity is achieved using *C. bombicola*, which can produce upwards of 400g/L of sophorolipids. In general, these high productivities are obtained by supplying the yeast with glucose and a lipophilic substrate which may include triglycerides, fatty acids or (m)ethyl esters thereof. An important drawback in the biosynthesis of these biosurfactants is the narrow range regarding the chain length of the lipophilic substrate. This range allows for chain lengths of palmitic and stearic acid, or any of their unsaturated counterparts, to be directly converted into sophorolipids. Fatty acids of chain lengths above this range are oxidised by the organism until short enough whereas chains which are too short are utilised as an energy source. For the more common detergent applications, sophorolipids normally produced by *C. bombicola* are too lipophilic. Research into obtaining short-chained sophorolipids currently focuses on using short-chained lipophilic substrates which have an activated site to which the yeast adds two molecules of glucose which constitute the sophorose. The nature of these substrates, having to be oxidised at a specific location and, in the case of sub terminal alcohols, to a specific stereochemical configuration makes for them being rather on the expensive side. Here we present an alternative in the form of a lipophilic substrate which has a chain length in the palmitic/stearic range, and is as such converted into a sophorolipid, but contains a hydrolysable bond that can be cleaved to yield short-chained sophorolipids. This allows for both a choice in the length of the lipophilic moiety of the sophorolipid and in its terminal group. Several cleavable substrates where synthesised and fed to a *C. bombicola* culture. Aside from the classic sophorolipids, having oleic acid as the lipophilic moiety, new species were observed to be produced. Cleaving the incorporated bond produced sophorolipids which were expected to be synthesised, which was confirmed in subsequent RP-HPLC-MS analysis. Also, some unexpected sophorolipids were found to be produced, shedding some light as to how the activated fatty moiety is presented to the first glucose subunit.