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ENGINEERING AMINO ACID PRODUCING *Corynebacterium glutamicum* FOR ACCESS TO ALTERNATIVE CARBON SOURCES

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Abstract

The Gram-positive soil bacterium *Corynebacterium glutamicum* is an important industrial producer of various amino acids, with an annual production of about 2.5 million tons. These established large-scale biotechnological processes currently rely on glucose, fructose and sucrose as carbon sources. An emerging issue is the intensive utilization of media based on starch and molasses, the main industrial sources of glucose and sucrose. A desirable advance, in the perspective of an environmental sustainability, is to broaden the spectrum of substrates usable by *C. glutamicum*, developing producing strains able to utilize or co-utilize wastes from agro-industry and food-industry as carbon sources.

The development of strains able to utilize hitherto inaccessible carbon sources has been made possible through the characterization of already existing pathways in *C. glutamicum*, as well as the engineering of heterologous pathways in order to improve carbon substrate utilization, with a particular attention to those available from the agro- and fisheries industries. The efficient utilization of wastes from marine food-processing industries into useful products has become an environmental priority.

Initially, the attention was focused on a more efficient use of agro-industrial wastes, such as arabinose and xylose, deriving from lignocellulosic hydrolysates. But access to new carbon sources has also been engineered, in particular, for utilization of glycerol and amino sugars. Glycerol arises in large quantities in the biodiesel production process as major by-product of plant seed oil transesterification with methanol. Amino sugars have an undisputed potential because they could serve both as carbon and as nitrogen source for fermentation processes.

Progress and future challenges of approaches to alternative carbon sources for *C. glutamicum* will be discussed.