Production of vitamin B9 from local residual biomasses

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Abstract: In the European Union (EU) 2.5 billion tons of wastes are produced every year. Biorefineries configure as a key enabling technology to valorize these residues to produce nutraceuticals, feed, and chemicals.

Vitamin B_9 (or folate) is an essential component of the human diet, since it is involved in the synthesis, repair, and methylation of nucleic acids. Vitamin B_9 deficiency can cause different diseases, from anemia to mental disorders.

My thesis project focuses on the biotechnological production of folate by valorizing residual biomasses, in particular agricultural (sugar beet pulp and molasses) and wine (unfermented pomace and lees) residues. Two naturally producing folate yeasts – *Saccharomyces cerevisiae* and *Scheffersomyces stipitis* – will be used as cell factories. Part of the work will focus on the metabolic engineering of *S. cerevisiae* in order to increase the endogenous production of folate mainly from the glucose fraction of the above-mentioned biomasses; at the same time, *S. stipitis*, a yeast able to naturally consume both C5 and C6 sugars will be developed for the complete valorization of residual biomasses. The final aim of the project is the creation of an integrated biorefinery by developing a synthetic microbial consortium with the two yeasts able to valorize most of the nutrients released by the residual biomasses after pretreatment.