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The flexibility of *Scheffersomyces stipitis* to valorize residual biomasses for Vitamin B_9 production

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Abstract:
Lignocellulose is the main structural component of woody and non-woody plants, representing a major potential source of renewable organic matter, being also sustainable when residual and non-edible fractions are considered. Lignocellulose is primarily composed of two carbohydrate polymers (cellulose and hemicellulose) and by lignin (an aromatic polymer). These complex polymers contain different sugar monomers and phenolic precursors, harboring an enormous biotechnological value, since they can potentially be converted into different value-added products.

The present work aims at the valorization of residual agricultural biomasses into folates by a yeast cell factory. Folate is a B-complex vitamin, currently produced mainly in the oxidized form of folic acid (FA). Contrary to other vitamins, the production still relies on chemical synthesis: it is therefore desirable to develop novel economical and sustainable strategies towards replacing the current fossil-based production with a bio-based process, employing residual biomasses from agriculture.
The production of folate was here evaluated exploiting the yeast *Scheffersomyces stipitis*, which is naturally able to produce folates, and to the best of our knowledge it has never been investigated for this ability.
Three different residual biomasses were used as substrate, namely sugar beet molasses (SBM), sugar beet pulp (SBP), and unfermented grape marc (UGM), in shake flask fermentations. *S. stipitis* was able to metabolize the sugars present in these biomasses; folate productions reached 188,23 µg/L ± 24,86 on SBM, 130,60 µg/L ± 1,34 on SBP, and 101,92 µg/L ± 6,62 on UGM, which are interesting when compared to the well-known yeast *Saccharomyces cerevisiae*.

These results provide a solid starting point for setting up bioreactor fermentations: attention will be given to the optimization of the parameters for maximizing the production, while fully exploiting the residual biomasses, in order to obtain data for a techno-economic analysis.