Erythritol from straw
A multilevel feasibility study in *Trichoderma reesei*

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Erythritol is a naturally abundant sweetener gaining more and more importance especially within the food industry. It is widely used as sweetener in calorie-reduced food, candies, or bakery products. In research focusing on sugar alternatives, erythritol is a key issue due to its, compared to other polyols, challenging production. It cannot be chemically synthesized in a commercially worthwhile way. Studies are therefore focusing on the biotechnological production of erythritol.

Using the industrial cellulase and hemicellulase production fungus *Trichoderma reesei*, we applied different approaches to increase erythritol production: substrate selection and treatment, strain improvement by metabolic engineering as well as process optimization. The organism is able to degrade lignocellulosic material and can therefore utilize renewable and cheap material, like wheat straw as starting material. The substrate can be pretreated to facilitate analysis and speeding up the degradation by *T. reesei*. We analyzed different types of straw and hydrolyzation parameters to find the most suitable starting material for the erythritol production in *T. reesei*. The key enzyme for the synthesis of erythritol is naturally present in *T. reesei*. The overexpression of this gene leads to an increase in erythritol synthesis. Further genetic modifications include deletion, overexpression and co-expression of different, not yet characterized enzymes, which may be involved in the erythritol production pathway. To further improve the production yield and facilitate the future purification, we anticipate introducing a known sugar transporter from *Saccharomyces cerevisiae.* Besides substrate and genetic modifications we performed a Design of Experiment to gain information about the influence of certain production parameters like osmotic pressure or fermentation time.