

phytomining

Products by phytoinspiration is the mission of Phytowelt GreenTechnologies. To this end, our unique modular service and technology package **phytomining** provides all the tools and methods for developing and implementing sustainable biotechnological production processes and new products for a circular bioeconomy.

phytomining enables (bio)economic production of valuable materials!

The modular **phytomining** process has been consistently developed over a decade and now covers all process development steps: From the product idea, through conceptual design, the generation of optimised microbial product strains, to the development of the (fermentative) production process and its up-scaling to pilot scale, all development stages can be implemented with the company's own personnel and equipment.

Thanks to its modularity, customers can commission the entire process, but also partial aspects. In this way, we can implement approaches specifically tailored to customers in the laboratory at any time. **phytomining** is also used for our own developments. Phytowelt has developed a unique product in the form of the aroma substance (R)-alpha-ionone, brought it to market maturity and established a large-scale production facility.

phytomining: From the idea to the production organism

Plant metabolism provides diverse inspiration for what is biochemically feasible (especially for complex structures) and is also a rich source of unusual enzymes. It is therefore the starting point for the design of new product biosyntheses that can be implemented in microorganisms.

The design of the enzyme cascades is based on a knowledge-based approach that combines four different areas (Fig. 1). The area of genetics comprises the efficient, bioinformatically driven identification, cloning and modification of genes. Our specially developed basic technologies (see below) provide the appropriate tools for functional enzyme expression in recombinant systems such as *E. coli*, yeasts, *B. subtilis* and *C. necator*. In the field of biochemistry we are continuously expanding our broad portfolio of *in vitro* and *in planta* assay systems to characterise enzymes.

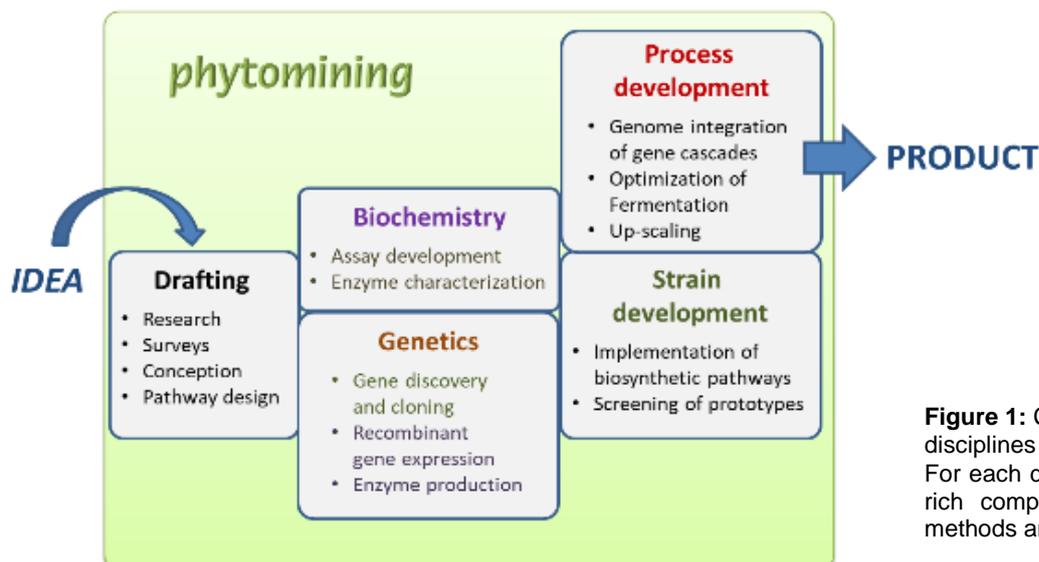


Figure 1: Core activities in the disciplines of **phytomining**. For each discipline we have a rich compendium of diverse methods and expertise.

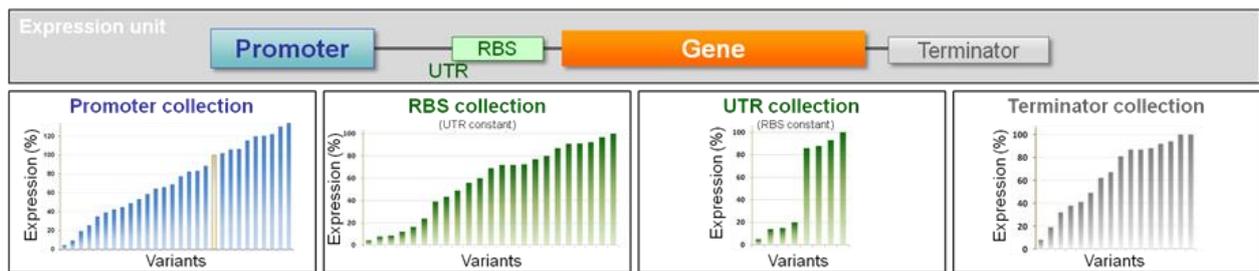


Figure 2: Available collections of genetic tools allow the targeted expression of target genes to optimise the synthesis performance of a biosynthetic pathway.

Strain development uses our extensive range of molecular tools to build optimal biosynthetic systems. Our proprietary collections of genetic elements (Fig. 2) can be used to fine-tune the expression of individual genes and gene cascades. As essential partner proteins for the important enzyme class of P450 monooxygenases, modified and highly active cytochrome P450 reductases are available in a rich library.

phytomining: process development

Functional biosynthetic enzyme cascades are inserted into the host genome as standard (genome integration) in order to obtain final production strains that are free of plasmid and antibiotic resistance and can thus also be used on a large-scale and in contract fermenters.

The plant potential is convincing! In addition to customer enquiries, we also use our tools for our own product developments, especially in the field of terpenes, the largest class of secondary plant compounds with many interesting bioactivities (e.g. as antioxidants, medicines or flavourings).

phytomining also helps you to obtain and commercially implement a tailor-made fermentative production process for your desired product!

Are you curious about this technology? Then please contact us!



Figure 3: Our fermentation lab allows piloting up to a scale of 150L

We use our own extensive expertise to develop optimal fermentation protocols for the strains and scale them up to a maximum of 150 litres. A technological maturity is achieved (TRL8) that allows transfer to large-scale production.

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