



# GLYTECH

A new platform for the synthesis of high-value glycoconjugates

## Overview

Glytech offers a clean, simple and natural route for custom synthesis of regiospecific glycosides. These conjugates have utility as: (1) active pharmaceutical ingredients; (2) nutraceuticals and dietary supplements; (3) topical health care products; (4) standards for drug metabolites in clinical trials.

The technology of Glytech can be used to provide either novel molecules or to improve the properties (solubility, stability, bioavailability) of existing compounds.

Glytech also offers the means to accumulate high value natural products as glycosides in field/containment applications.

This technology is based in the Centre for Novel Agricultural Products (CNAP) at the University of York.

## Technology

The technology platform of Glytech consists of:

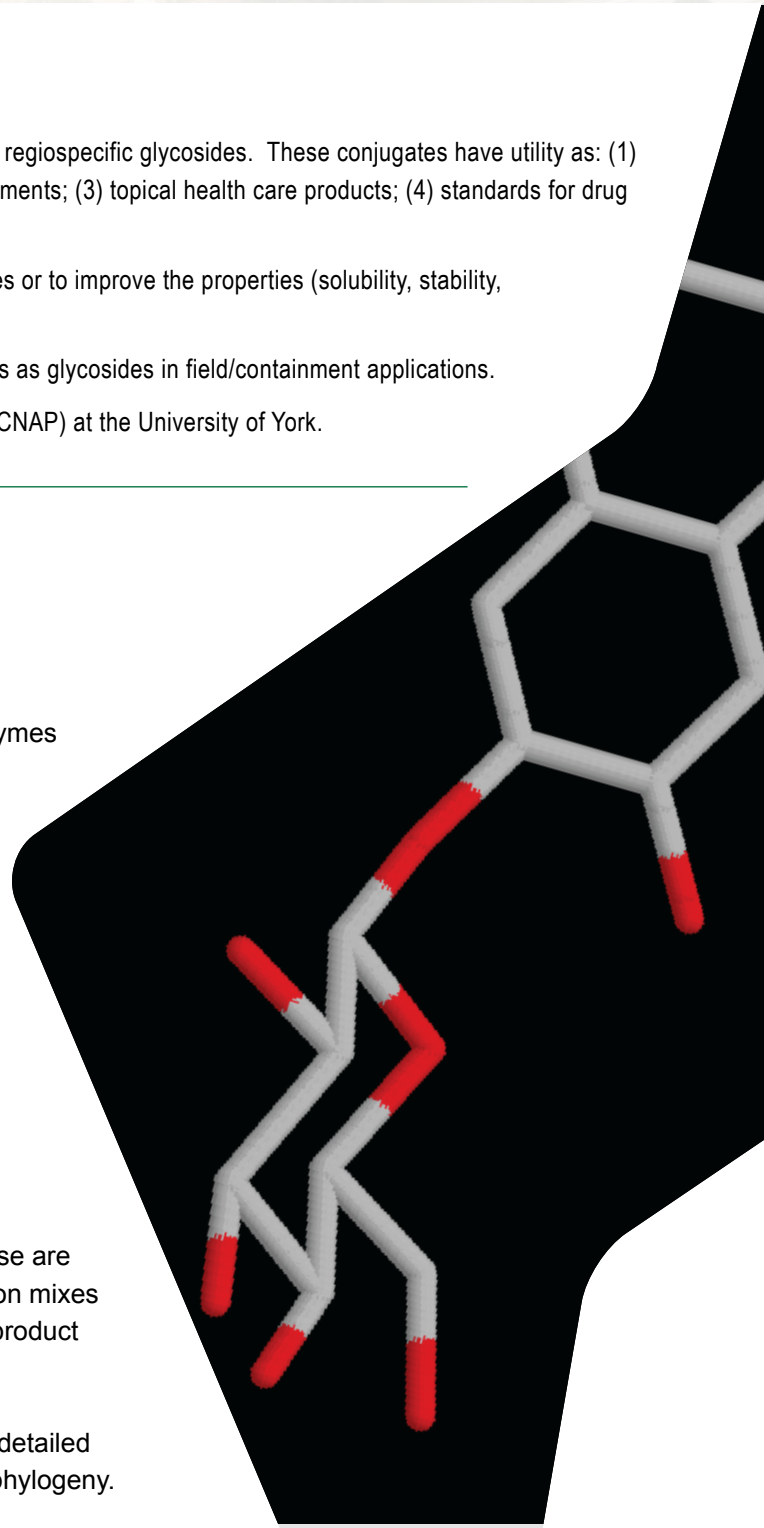
### The glycosyltransferases (GTs) library

The current Glytech GT library contains 107 recombinant enzymes of arabidopsis and 33 recombinant enzymes of rice as well as engineered variants of native enzymes. Within the Glytech database, an additional 120 rice sequences and 177 grape sequences have been annotated ready for cloning and expansion of the library.

The Glytech GTs catalyse inverting glycosylation reactions, and typically use UDP- $\alpha$ -glucose as sugar donor to form  $\beta$ -glucoside products. Other nucleotide sugars such as UDP- $\alpha$ -galactose, UDP- $\alpha$ -glucuronic acid, UDP- $\alpha$ -xylose and UDP- $\beta$ -rhamnose are also recognised by this family of GTs.

Activity screening uses either recombinant GTs purified from *Escherichia coli*, or protein extracts of the bacterial cells. These are incubated with scaffolds and sugar donors of interest. Reaction mixes are routinely analyzed using HPLC, MS and NMR to confirm product identity and the region/enantio-selectivity of catalytic activity.

A unique predictive capacity has also been established using detailed analyses of substrate recognition, catalytic activity and gene phylogeny.



CNAP

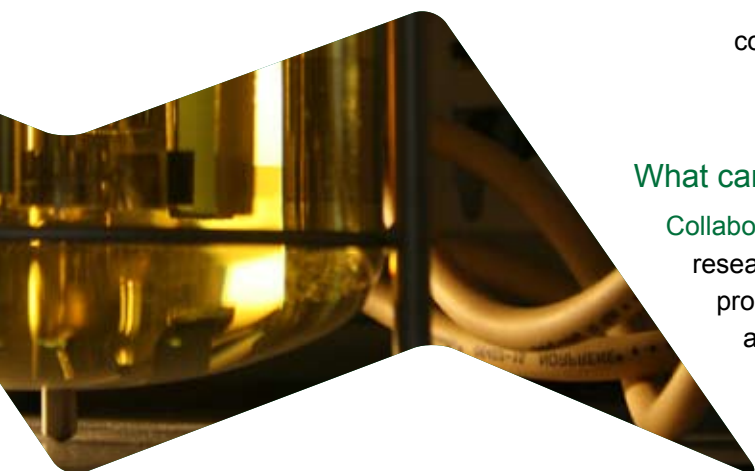
CENTRE FOR NOVEL AGRICULTURAL PRODUCTS



THE UNIVERSITY of York

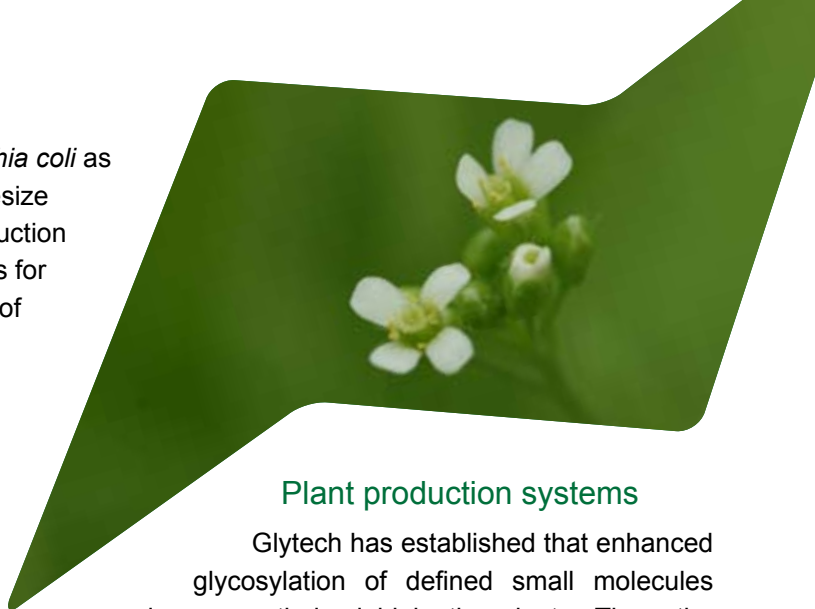
## Microbial production systems

The microbial production system currently uses *Escherichia coli* as the host to express recombinant GT enzymes and synthesize glycoside products. The advantage of the microbial production system is that the host cells provide the sugar nucleotides for the transfer reactions, by-passing the need and expense of providing supplementary co-factors. This whole-cell biocatalysis system has been engineered and optimised for transfer reactions involving different sugar nucleotides. Acceptors incubated with bacterial cultures are typically transported into the cells and the glycosides of those acceptors, produced by the GTs expressed in the bacterial cells, are exported out into the culture medium. This process enables ease of purification of the products from the culture medium by chromatography.



## Plant production systems

Glytech has established that enhanced glycosylation of defined small molecules increases their yield in the plant. Thus, the over-expression of a GT recognising a specific aglycone can lead to an increased production of the corresponding glycoside. The glycoside can be readily converted post-harvest back to the aglycone.



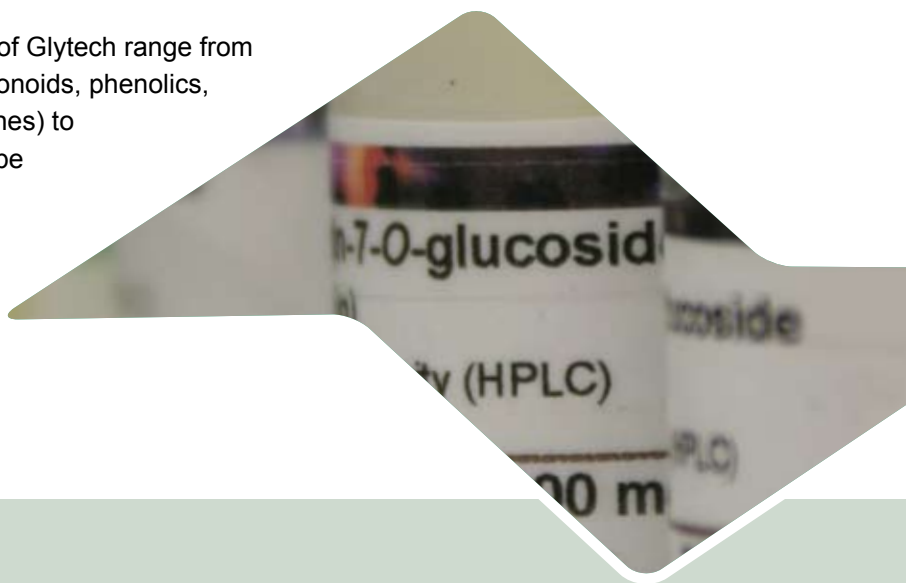
## What can we offer ?

**Collaboration and Contract research:** Glytech undertakes contract research to identify GT biocatalysts towards scaffolds from the clients proprietary chemical libraries and to deliver glycosylated products at gram quantities.

**Co-developments:** Glytech also seeks collaborations aimed at generating shared IP and downstream benefits from novel glycosylated compounds.

## Products

The chemical scaffolds applied to the technology of Glytech range from diverse classes of natural products (including flavonoids, phenolics, terpenoids, alkaloids, fatty acids and phytohormones) to synthetic small molecule chemicals. Sugars can be attached regioselectively and enantioselectively to the OH, SH, NH or COOH groups of the molecules. Products can be derived from scaffolds that are commercially available or from the proprietary chemical libraries of the clients.



## Contact

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**For more information, please visit [www.glytech.co.uk](http://www.glytech.co.uk)**