CHEMICAL SYNTHESIS OF UDP-SUGAR DONORS FOR THE IDENTIFICATION AND CHARACTERIZATION OF PLANT GLYCOSYLTRANSFERASES

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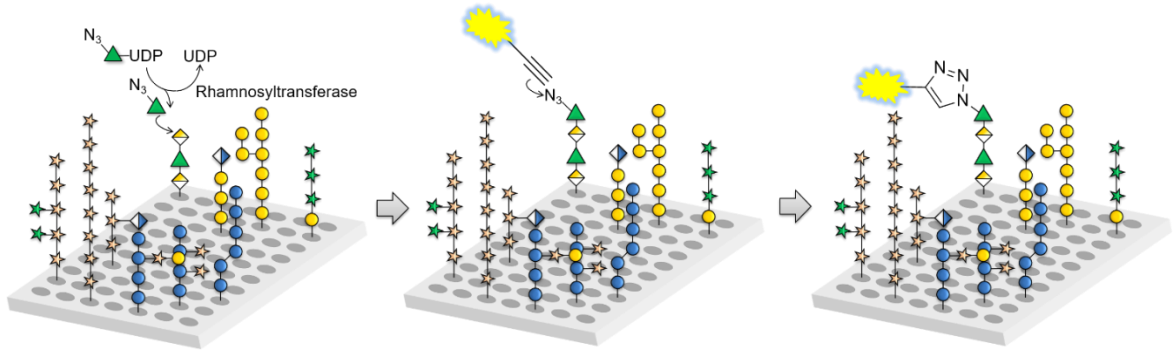
As plant cell walls represent the most abundant renewable resource on Earth, understanding the structure, function and biosynthesis of plant glycans is critically important [1]. Although the identification and characterization of plant glycosyltransferases (GTs) is vital to elucidate these biosynthetic pathways, only a few GTs have been biochemically validated so far [2]. Effective tools for GT analysis are therefore crucial in plant cell wall research.
GTs facilitate the transfer of monosaccharides from activated donors to acceptor substrates, making the availability of such probes critical for GT analysis, for instance using glycan microarrays. These enable the immobilization of hundreds of acceptors, allowing for high-throughput GT substrate specificity studies [3].
We report the chemical synthesis of two uridine diphosphate-activated sugar (UDP-sugar) donors involved in plant cell-wall biosynthesis. We describe the syntheses of UDP-rhamnopyranose and UDP-arabinofuranose, along with their azido-modified analogues, which enable direct detection via click chemistry on glycan microarrays [4]. Efforts towards the synthesis of UDP-apiofuranose and its azido-modified analogue are also reported [5].
Finally, a glycan microarray-based study of GTs using the synthesized UDP-sugars is presented [4]. Analysed GTs include xylan arabinosyltransferase XAT3, involved in the biosynthesis of a hemicellulosic glycan, and rhamnosyltransferases RRT4 and RRT5, involved in the biosynthesis of a pectic glycan.



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