An approach based on enzymatic digestion highlights the crucial role of pectin in pollen tube adhesion

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Summary In the context of climate change and global population growth, sustainably feeding the world's population has become an critical challenge. A deeper understanding of sexual plant reproduction is a key factor for improving seed and fruit production, which form the cornerstone of human and animal nutrition. During sexual reproduction, pollen grains land on the stigma, where they adhere, germinate, and generate a pollen tube. The pollen tube transports male gametes through the style and ovary toward the ovules, guided by several mechanisms, including adhesion to the cell walls of female tissues. This adhesion is thought to be mediated by cell wall polysaccharides, particularly pectic polysaccharides. However, the specific pectic structures required for pollen tube adhesion remain poorly characterized.

To address this, we adapted an *in vitro* pollen tube adhesion assay using an artificial matrix enriched in pectin-containing cell wall extracts from wild-type *Arabidopsis thaliana* plants and mutants impaired in pectin biosynthesis or remodelling. The deconstruction of these pectin-enriched extracts with specific glycoside hydrolase enzymatic treatments followed by Size Exclusion Chromatography has allowed the identification of pectin motifs with different compositions and molecular weights specifically involved in pollen tube adhesion.