Cellulose Biosynthesis in Developing Cotton Fibers

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Abstract: The mature fiber is an elongated epidermal cell of cotton ovule with a thickened secondary cell wall composed mainly of cellulose. Because cotton fibers are unique cells that differentiate synchronously and synthesize massive cellulose only at the secondary cell wall synthesis, they have become one of model plants for the study of the molecular mechanism and regulation of cellulose synthesis. Furthermore, the study of cellulose synthesis in the cotton fiber has obvious implication of putting in practice of molecular engineering for overcoming the difficulty of hybrid breeding in improving cotton yield and cotton quality simultaneously, because the initiating time, rate and deposition patterns of cellulose synthesis within secondary cell wall have a marked influence on fiber production and fiber quality. In this review, the progresses about the site, substrate, gene expression and regulation, and a carbon metabolism model of cellulose synthesis in developing cotton fibers were discussed.

Key words: cotton fibers; cellulose biosynthesis; expression and regulation of gene