# COTTON ABSCISSION: ULTRASTRUCTURAL FEATURES AND EXPRESSION OF ABSCISSION-SPECIFIC GENES

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## Abstract

Boll abscission limits yield potential, and delayed leaf abscission increases staining and trash in lint during harvesting. Manipulation of cotton abscission will lead to increased yields and improved lint quality. Structural changes contributing to abscission in cotton petioles were determined. A cDNA and a subtracted cDNA library were constructed from cotton petiole abscission zone tissues. Explants from greenhouse-grown cotton seedlings, *Gossypium hirsutum* L. 'Deltapine', were used for microscopic studies. Abscission was induced by applying 0.1% ethephon in lanolin paste to petiole stumps. Intact seedlings were sprayed with 2% ethephon to induce abscission for molecular studies. Petiole tissues were collected at selected times after treatment for light, TEM and SEM studies and 48 hours after treatment for molecular studies. The abscission zone is indistinguishable from adjacent tissues prior to ethephon treatment. Ethylene, released from ethephon, induces the swelling of collenchyma and parenchyma cells within the petiole prior to cell separation. Separation results from breakdown of the middle lamella and part of the primary cell wall. Some cells break down and release vesicles into the region of the degraded cell wall. In other cells, the plasma membrane remains intact following separation, but cells contain degraded cytoplasmic organelles.

Northern and Southern blot experiments indicate no homology between soybean and cotton abscission cellulase genes. Thus, heterologous probes for abscission-related genes may not be useful in identifying cotton abscission-specific clones. Consequently, a cDNA and subtracted cDNA library have been constructed from cotton petioles and abscission specific clones have been isolated. Experiments are in progress to identify the cDNA clones and study expression of these genes in abscission zone tissues. Results of this research will provide genetic tools for regulating abscission in cotton to enhance sustainability of this crop.

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