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Cellulase Localization and Membrane Changes during Ripening in Avocado Fruit

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Abstract. **Softening is one of the most obvious changes associated with ripening in avocado fruit. Evidence obtained by many researchers has shown that the mechanism of fruit softening involves the degradation of the mesocarp walls. Cell wall degradation is likely brought about by the concerted action of several enzymes including cellulase, polygalacturonase, and pectinmethylesterase. All of these enzymes must be synthesized in the cytoplasm and then transported across the plasma membrane to the cell wall before they can act. Our work has focussed in the appearance of cellulase during the onset and progression of ripening. As tagged and visualized with a specific antibody marker, cellulase initially appears near the stylar end of the fruit during the climacteric rise in respiration. As ripening progresses, cellulase appearance spreads throughout the mesocarp. At the subcellular level, cellulase appears first in the endoplasmic reticulum, the plasmodesmata, and finally the cell wall. The importance of certain membranes in cellulase synthesis and transport is reinforced by the results of our biochemical studies. The buoyant densities of Golgi and plasma membranes, but not thylakoid and mitochondrial membranes, increase during the climacteric rise in respiration. The protein components of the membranes exhibit several ripening-related changes, including the appearance of biosynthetic intermediates of cellulase in the endoplasmic reticulum, Golgi. and plasma membranes. These results deepen our understanding of how wall softening is brought about during avocado ripening (Supported in part by the California Avocado Commission).**