

**Title** New insights into cell wall disassembly during fruit ripening  
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### **Abstract**

**Purpose of the review:** Significant steps have been made in revealing the basic regulatory mechanisms that underlie cell wall disassembly during fruit ripening. This review presents key concepts arising from recent inquiries into how cell wall proteins and other regulators dismantle fruit cell walls. Progress made since 2000 is highlighted.

**Findings:** Several major findings are reviewed including the discovery that: multiple proteins are needed to modify individual cell wall polysaccharides; species-specific differences exist in regulator levels or activities and in how they cooperate with other enzymes or proteins; complex combinations of temporally and spatially regulated proteins disassemble higher-order polysaccharide structures; suppressing the action of specific expansins, pectate lyases and  $\beta$ -galactosidases reduces fruit softening but fails to eliminate all softening behaviour.

**Limitations:** The substrates and functions of some very well-characterised cell wall modifying proteins expressed in ripening fruit are still unknown. On the other hand, evidence supports the action of completely uncharacterised enzymes in fruit cell walls, as well as unexpected regulator candidates that include non-enzymic chemical species. Efforts to determine when and where these regulators act to disassemble cell walls have been limited by the complexity and heterogeneity of polysaccharide structural features.

**Directions for future research:** Postharvest biologists are encouraged to continue to exploit molecular, genetic and functional genomic information developed in model plant systems in ripening research. Experimental tools and technologies developed for study of cell wall disassembly during plant growth are important additions to future approaches to elucidate cell wall structure in ripening fruits.