

Title Delivering postharvest handling protocols for apples and pears faster: integrating "Omics" and physiology approaches

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Abstract

Accelerated development of postharvest handling protocols is needed to establish and maintain market confidence for new apple and pear cultivars. Although current empirical approaches can ultimately be very successful for developing handling protocols, they can take many years to develop, which increases the risk of poor fruit quality, fruit losses and loss of confidence in the new cultivar. Development of handling protocols is prolonged by the need to investigate cultivar responses to a wide range of factors, such as harvest date, cooling rate, storage temperature, 1-methylcyclopropene (1-MCP), and controlled atmospheres. For pears there can be additional requirements related to ripening protocols for "ready to eat" programmes, which typically investigate chilling and/or ethylene treatment impacts on softening. Development of handling protocols could be accelerated if elite selections and new cultivars could be screened for risk factors (e.g., physiological disorders) before commercialisation. If storage risks are revealed at the pre-commercial stage of development, then postharvest experiments can be targeted more effectively to develop early handling guidelines. To achieve this outcome, an improved understanding of the mechanisms involved in postharvest processes is needed. Recent advances in global screening approaches to analyse the transcriptome, proteome and metabolome ("omics") have opened up new opportunities for dissecting postharvest responses that may allow screening of elite selections and new cultivars. Germplasm collections also offer a resource for achieving a more generic understanding of postharvest traits across a wide genetic base. This will be important in the future for predicting the postharvest responses of new cultivars in the supply chain, particularly those with novel traits developed from recent introduction of "wild" parentage or from interspecific crosses.