

## Abstract

The single-edge notched bend (SENB) test is a technique for measuring fundamental properties of materials. This technique is an easily applied measure of fruit texture that is related to sensory characteristics such as ‘crunchiness’ [Vincent, J.F.V., Saunders, D.E.J., Beyts, P., 2002. The use of critical stress intensity factor to quantify “hardness” and “crunchiness” objectively. *J. Texture Stud.* 33, 149–159]. The present study focuses on the relationship between SENB and the penetrometer test routinely used for fruit quality assessment. Fruit from cultivars Cox's Orange Pippin, Sciros, Sciearly and Scifresh were removed from cold storage at regular intervals, and texture was assessed after 1 and 7 days at 20 °C. Texture was measured using a conventional puncture test with an Effegi probe and a SENB test. During the SENB test, a notched beam of apple tissue was subjected to three-point bending until it broke. Fracture toughness ( $K_{Ic}$ ) and fracture energy ( $G_c$ ) were calculated, and Low-Temperature Scanning Electron Microscopy (LTSEM) was used to examine the fracture surface following beam failure. Both  $K_{Ic}$  and  $G_c$  were correlated with puncture force, but the relationship was different for Sciros and Sciearly (two siblings from a Gala × Splendour cross) compared to the other cultivars. Sciros and Sciearly apples had higher  $K_{Ic}$  and  $G_c$  values than would be anticipated from measurements of puncture force. This supports the suggestion that these apples are crisper when eaten than might be expected from puncture (penetrometer) values. Comparison of the texture of shrivelled and non-shrivelled Sciros apples indicated that puncture measurements are unreliable when fruit are dehydrated. Puncture measurements suggested shrivelled apples were ‘crisper’ than non-shrivelled fruit, while SENB parameters indicated the reverse.