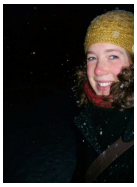
Controlled fracture behaviour of peas via the state diagram



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Motivation:

Plant protein concentrates are usually produced by wet processing. Dry fractionation by fine milling and air classification is a more sustainable method yielding a functional concentrate. Milling is required to break starch granules loose from the protein matrix (fig 1). Fracture behaviour is dependent on mechanical properties of the cell constituents, which vary with moisture content and temperature.

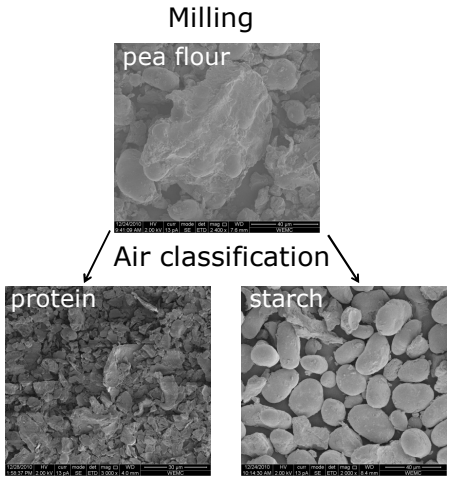

Figure 1: Scanning Electron Microscope (SEM) images of pea (Pisum sativum) fractions

Objective:

Understand fracture behaviour of pea tissue to optimise dry fractionation.

Results:

The break behaviour of peas was investigated with help of a state diagram. Figure 2 was constructed with DSC results and models. Peas from the three regions were broken. From these images, together with texture analyser results (not shown), it can be concluded that break behaviour is dependent on the state of peas. At a low moisture content and room temperature peas are more brittle, which is related to a lower energy consumption during milling.

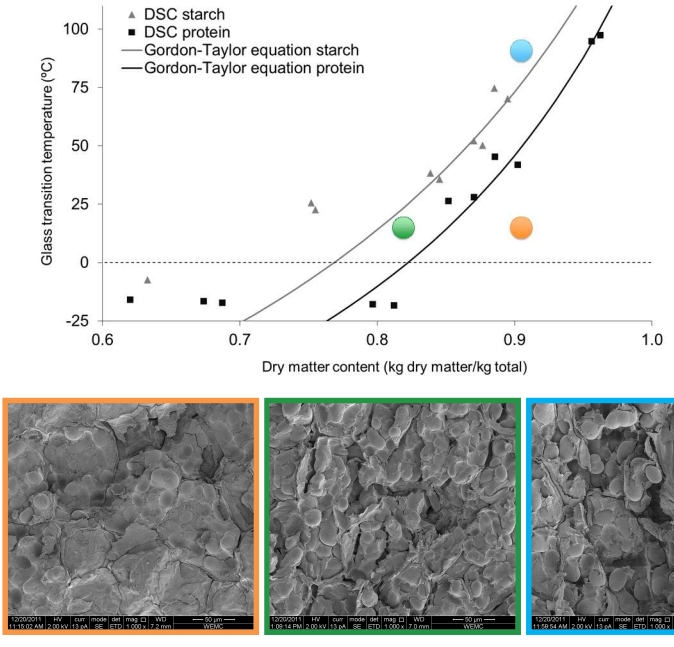

Figure 2: State diagram of pea protein and starch isolates with SEM images of peas broken at different points.