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Title:

Probing the structural changes of commercial plant proteins during gelation with neutron scattering techniques

Authors & affiliations:

Name and surname	*Institution/ Department, University, Country*
Alice Yong Jia Tiong	*Agriculture and Food, CSIRO, Australia*

Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.

Introduction: Clearly state the purpose of the abstract
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Protein gelation is central to developing texture in plant-based foods, yet the mechanisms governing this process are still not well understood for plant proteins, especially those produced through commercial extraction methods. This work examined the gelation behaviour of proteins from yellow pea with a focus on how factors such as extraction method and solvent condition can affect protein properties such as solubility, particle size, and gelation strength.

Using small-angle neutron scattering and ultra small-angle neutron scattering, we observed that intensive extraction methods such as isoelectric precipitation produced proteins with low solubility and larger insoluble particles, leading to gelation dominated by changes in the insoluble fraction. In contrast, gentler processes such as ultrafiltration yielded higher solubility and smaller particles, with gelation involving both soluble and insoluble proteins. These differences translated into distinct gel structures as seen through microscopy techniques: fractal networks formed in low-solubility systems, while more uniform networks emerged in high-solubility systems. Interestingly, gels from both pathways achieved similar overall strengths despite their contrasting microstructures. This demonstrates that both commercial and lab-extracted protein isolates are able to exhibit similar gelation strength/textural properties, however the mechanism is different depending on the types of protein that are present (fraction of soluble proteins vs insoluble proteins).