**Thicker than water: exploring the diverse relatives of *Plantago ovata* to address the narrow hydrocolloid functionality of psyllium in food and the gut**

JM Cowley1, L Strkalj1,2, GE Yakubov2, TJ Foster2 and RA Burton1

*1Discipline of Food Science, School of Agriculture, Food and Wine, University of Adelaide, Urrbrae, South Australia, Australia*

*2* *Soft Matter Biomaterials and Biointerfaces, Food Structure and Biomaterials Group,*

*School of Biosciences, University of Nottingham, Sutton Bonington LE12 5RD, United*

*Kingdom*

Psyllium husk (PH), a heteroxylan (HX)-rich material milled from the surface of *Plantago ovata* seeds, is known for its high viscosity and gelling capacity making it a widespread fibre supplement and hydrocolloid in foods. However, PH applications face challenges, including hydration adjustment difficulties and sensory issues like gumminess. These arise from HX's unique rheological and water-holding behaviours, which were previously poorly understood.

Over the past decade, we have employed various plant science strategies to uncover the drivers of PH quality, making significant advances in its development and genetics1. However, we have also demonstrated that *P. ovata* has extremely limited genetic variation, resulting in a narrow range of HX properties for tailored applications. Through fractionation and advanced rheological techniques, *P. ovata* HX has been shown to form ‘physical gels’, with substitutions playing a critical role in network formation and rheological behaviour2. With this considered, we have explored dozens of alternative *Plantago* species and discovered that HX is shared as the most abundant polymer, but importantly their substitution levels, and subsequent rheological and water absorption behaviours, vary widely. Adding whole seed flour from several diverse *Plantago* species to gluten-free bread showed that the texture- and dough rheology-enhancing properties partly independent of HX *content* and chemistry and were more strongly associated with the *proportion* of more gel-like (greater *G*’ and lower tan δ) HX fractions3. One species that we have named Australian Psyllium (AP) showed particularly potent hydrocolloid behaviour (even compared to PH) so we have employed fractionation and binary starch-HX gel fabrication to probe this further, showing that AP HX and AP HX-starch gels had extremely high resilience under dynamic oscillatory deformation, with flow points and flow transition indices double that of *P. ovata* HX and HX-starch gels. Applying AP *in vivo*, these advantages provide more potent dietary fibre functionality, reducing cholesterol levels more than *P. ovata* in mice fed an obesogenic diet.

Exploring the diverse relatives of *P. ovata*, we show that this is a richer resource for targeted hydrocolloid functionality. Future work will compare AP and *P. ovata* HX chemistry and rheology more deeply to uncover the underlying mechanisms, as well as exploring broader hydrocolloid applications.

*References:*

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