

Plantago *lanceolata* and Psyllium

Plantago lanceolata (Ribwort, or Narrowleaf Plantain) is a most unexceptional plant, recognised by many as a perennial, rosette-forming weed. It is widely distributed across the world, considered native to Europe, north Africa, the Middle East, right through to Asia. Outside this range, it is reported as invasive in North and South America, Siberia, Africa and Australia.

Surprisingly, it has many characteristics that make it quite exceptional, regarded as being beneficial as a pasture species for its palatable foliage and seed. Much more remarkable is the role that its pollen has played in unveiling the origins of agriculture in various parts of the world. In Scandinavian countries, the presence of *P. lanceolata* pollen together with that of cereals and other factors, has been used by archaeologists (palynologists) as indicators of the beginnings of human agricultural practice. In Norway, this revealed agriculture starting from the Middle Neolithic, (2200 – 1700 BC).



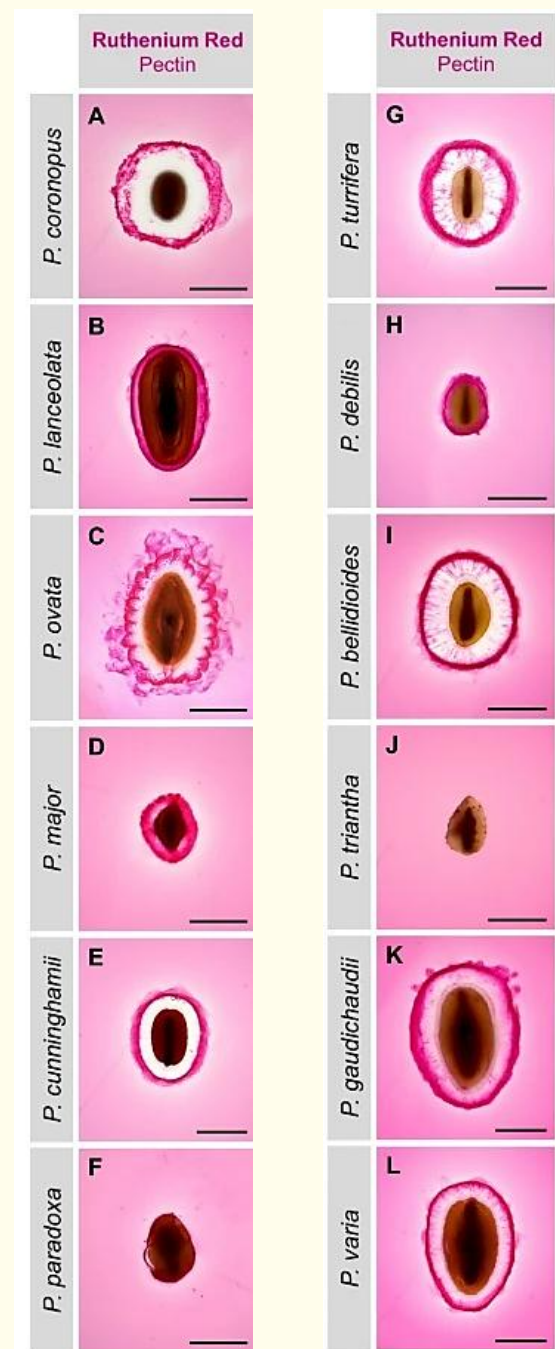
Plantago lanceolata

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So, what is psyllium and what is the connection to *Plantago lanceolata*? Psyllium is the husk of seeds of various species of *Plantago* and is grown commercially as a source of dietary fibre and key ingredient in the development of gluten-free food. The active ingredient in the fibre supplement *Metamucil* is a mucilage, **psyllium**, derived from the husks of *Plantago* seeds. Currently psyllium is produced from *Plantago ovata*

grown in India, but a team of researchers led by Professor Rachel Burton Adelaide, is working on the development of the species to provide a reliable supply of superior, high-quality psyllium.



Mucilage patterns of seed of 12 *Plantago* species stained with Ruthenium Red demonstrating the potential of native species as a source of psyllium. *Plantago ovata* is the species commonly cultivated for psyllium in the world today.
Figure: Cowley, O'Donovan & Burton 2021.

There are about 265 *Plantago* species, and of these, 33 are found in Australia, including 24 endemic species and naturalized species, including *P. lanceolata*. Native Australian *Plantago* species may provide the key to development of psyllium with superior gelling and water holding properties, and as the native species are well suited to growing in hot, dry and sometimes even saline conditions, it is anticipated they should succeed in cultivation in Australia. Psyllium from two Australian native species, *P. bellidioides* and *P. turrifera* has better gelling and water-holding capacity for use in gluten-free bread, than psyllium from traditional sources.



Professor Burton's team are developing a potential new crop from *Plantago* species, *New Australian Psyllium* (NAP). Already this has shown gelling and water holding capacity superior to that of the traditionally grown Indian psyllium, making it an ideal product for the gluten-free processed food production and for next-generation dietary fibre.

Whole seeds (embryos after removal of husks) of psyllium-producing *Plantago* species were



previously discarded but they are rich in nutrients and the Adelaide researchers found that utilization of **whole seed flour** produced from a diversity of *Plantago* species may be a far more nutritious and economic alternative to just using psyllium husk as a fibre supplement. Two species, *P. paradoxa* and *P. triantha*, contain higher fat and protein content, and species such as *P. turrifera* are rich in omega-3 fatty acids. The presence of fermentable sugars in others may benefit gut health by promoting beneficial gut flora.

So, weeds under our feet can have value. This drab and unglamorous plant is commercially important in agriculture and informs basic research in archaeology. What's more, it has Australian relatives that can play a major role in both the food and health industries.

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Wikipedia: https://en.wikipedia.org/wiki/Plantago_lanceolata

Wikipedia: https://en.wikipedia.org/wiki/Plantago_ovata

Wikipedia: <https://en.wikipedia.org/wiki/Psyllium>



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