**Unravelling Seed Coat Development to Maximize Lupin Grain Value**

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Lupin grain has a thick seed coat. In narrow-leafed lupin (also known as Australian sweet lupin or *L. angustifolius*) the percentage of seed coat is around 24% by weight compared with only 7% in soybean. The high proportion of seed coat in lupin reduces the economic value of the seed as after dehulling the seed coat is typically sold into low value uses. Reducing the seed coat thickness could lead to an increase in protein content therefore add significant value of this high protein pulse crop as a product or ingredient in food.

In model plants, such as *Arabidopsis*, *Lotus japonicus* and *Medicago truncatula*, research has shown that seed development is an intricate process which involves a complex interplay between seed coat, embryo, and endosperm. Genes, transcriptional regulation, and pathways involved in the programming of the interconnection are emerging. However, little is known about the genetic mechanism and metabolomic pathways underpinning seed coat development in lupins.

Seed coat typically composes of cuticule, macrosclereid layer, osteosclereid layer and parenchymal cells structures. Using a combination of imaging technologies, we have identified some characteristics of lupin seed coat structures. Analyses of seed coat structures during lupin grain development suggest some temporal and spatial events could attribute to the unusual thickness of the lupin seed coat. We have identified underlying molecular frameworks which regulate lupin seed coat development. The ultimate aim of this research is to reduce the lupin seed coat thickness through next-gen breeding technologies and help to transform lupin from feed to food crop.