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Evaluation of starch granule morphology in wild relatives of rice using scanning electron microscopy

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Australia possesses a diverse range of wild rice species. Investigation of their morphology and starch properties may provide a platform for developing new hybrids or cultivars of cultivated rice. Starch functionality is influenced by ultra structure of endosperm and starch granule morphology[1,2]. A scanning electron microscopy study was used to investigate the endosperm and starch ranule morphology in species of Australian wild rice.

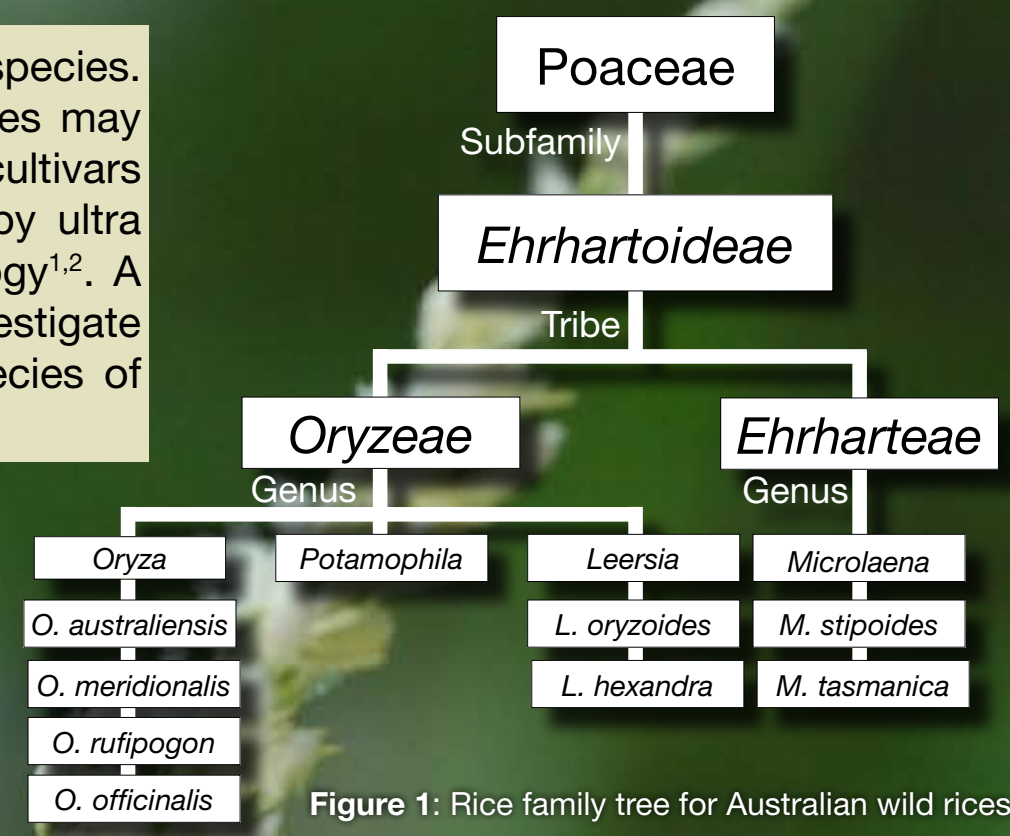

Figure 1: Rice family tree for Australian wild rices

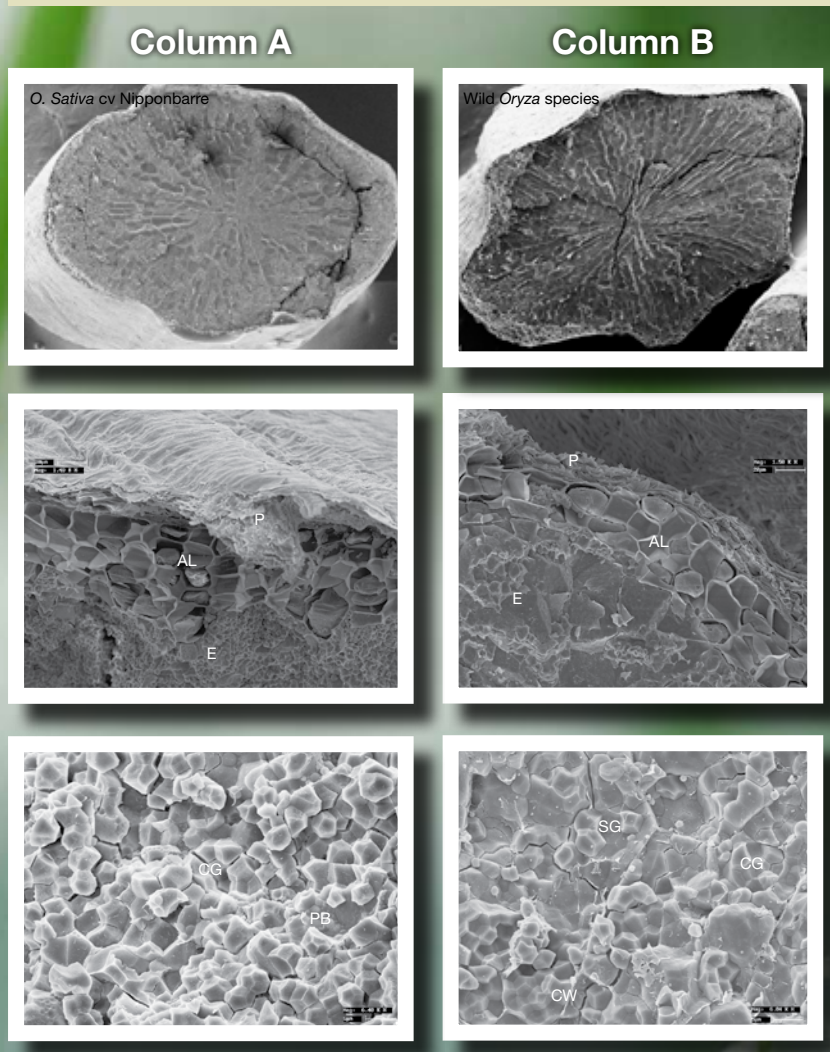

Figure 2: Scanning Electron Microscopy images showing the different grain morphologies present between cultivated (Column A) and wild Oryza (Column B) species. P-pericarp; CG- compound granule; AL- aleurone layer; E-endosperm; PB- protein bodies; CW- cell wall; SG- starch granule.

Figure 3: Grain colour and shape variation observed between the Erhartoideae. Images not to scale

Six seeds per species were manually de-husked and then fixed in formalin. Seeds then underwent a standard ethanol dehydration, were critical point dried and gold coated before being observed using a Leo440Stereoscan scanning electron microscope.

Wild rice species showed both differences and similarities in their endosperm morphology when compared to cultivated rice. Species differences in cell thickness of the aleurone layers were observed. The frequency of protein bodies also differed amongst the wild species and between wild and cultivated species. Further investigation by physio-chemical testing will reveal more information about the starch properties of wild species of rice.

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