Assessing the effect of environmental conditions on the properties of Spinifex-derived nanomaterials

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Spinifex, a native Australian arid grass, is an abundant and underused biomass resource, with at least 69 species covering 30% of Australia's landmass. The harsh outback environment has driven the evolution of key extremophile traits[1], conferring unique properties for Spinifex-derived materials. An economical, energy efficient protocol has been developed for the isolation of Spinifex-derived nanocellulose through mild alkali pre-treatment and mechanical energy-based high pressure homogenisation[2]. These methods facilitate the fibrillation of cellulose from micron-scale diameter fibrils to nano-scale fibres. Spinifex nanopaper, incorporating nanofibrillated cellulose (NFC) in a highly entangled network, is a sustainable high-performance material with tough yet formable properties. However, there is a lack in understanding of the genetic and environmental variabilities that generate biochemical differences between species of this highly-adapted grass. A systematic exploration of fundamental chemical and physical properties that underpin this unique material is required to accelerate the development of these Australian-based sustainable materials.

[1]Toon, A., et al., *Key innovation or adaptive change? A test of leaf traits using Triodiinae in Australia.* Scientific Reports, 2015. **5**(12398).
[2]Amiralian, N., et al., *Isolation of cellulose nanofibrils from Triodia pungens via different mechanical methods.* Cellulose, 2015. **22**: p. 2483–2498.