



**Systematic studies on *Thysanotus* R.Br.  
(Asparagales: Laxmanniaceae)**

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Cover photo: *Thysanotus multiflorus* R.Br. from Western Australia  
(Photo- Udani M. Sirisena)

## DECLARATION

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Udani Megha Sirisena (January 2010)



## **DEDICATION**

Dedicated to my loving husband and parents



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## ANTICIPATED PUBLICATIONS ARISING FROM THIS PH.D.

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**Sirisena UM**, Conran JG, Macfarlane TD (20XX) Generic relationships within Laxmanniaceae inferred from non-coding chloroplast DNA and morphology. *Australian Systematic Botany*.

**Sirisena UM**, Conran JG, Macfarlane TD (20XX) Phylogenetic relationships and major lineages within the genus *Thysanotus* R.Br. (Laxmanniaceae) determined from combined morphological data and anatomical data. *Australian Systematic Botany*.

**Sirisena UM**, Conran JG, Macfarlane TD (20XX) Phylogeny of *Thysanotus* R.Br. inferred from non coding chloroplast DNA sequences, nuclear sequences and morphological data. *Plant Systematics and Evolution*.

**Sirisena UM**, Conran JG, Macfarlane TD (20XX) The systematic significance of seed coat morphology in *Thysanotus* R.Br. and related Laxmanniaceae. *Botanical Journal of the Linnean Society*.

**Sirisena UM**, Conran JG, Macfarlane TD (20XX) The systematic significance of aerial stem anatomy in *Thysanotus* R.Br. (Asparagales: Laxmanniaceae). *Botanical Journal of the Linnean Society*.

**Sirisena UM**, Macfarlane TD, Conran JG (2009) *Thysanotus unicumensis* (Laxmanniaceae), a new species discovered in Unicum Nature Reserve, south-west Western Australia. *Nuytsia* **19** (2): 259–263.

**Sirisena UM**, Macfarlane TD, Conran JG (20XX) *Thysanotus racemoides* (Asparagales: Laxmanniaceae), a new species from South Australia and western Victoria. *Telopea*.



## ABSTRACT

*Thysanotus* R.Br. (Asparagales; Laxmanniaceae) is a genus native to Australia with c. 50 species distributed chiefly in Australia. To date, *Thysanotus* lacks proper and detailed systematic studies based on molecular and/or non-molecular data. Therefore, carrying out a detailed systematic study using molecular and/or non-molecular data seemed important. Furthermore, generic placement of *Murchisonia* Brittan has always been controversial and this placement required testing under a phylogenetic framework. The generic relationships within Laxmanniaceae/Lomandraceae are considered uncertain; therefore, a phylogenetic analysis using molecular and morphological data is necessary to properly understand the generic relationships of Laxmanniaceae.

Detailed studies on stem anatomy and morphology were carried out in order to understand the systematic significance and phylogenetic signal of these characters. The cp DNA (*trnL* intron and *trnL*-F intergenic spacer) and nuclear ITS2 gene regions were amplified and the results compared and combined with a morphological analysis. Phylogenetic analyses were carried out using *Arthropodium* R.Br and *Eustrephus* R.Br as outgroup taxa.

There was sufficient variation in general morphology, seed micromorphology and stem anatomy and were potentially useful in understanding phylogenetic relationships of *Thysanotus*. A number of synapomorphies based on general morphology and stem anatomy such as absence of pendent flowers and absence of irregular shaped epidermal cells were recognised. The molecular data and the combined data yielded highly resolved consensus trees and enabled us to recognise three main lineages within the genus, each representing life history adaptations. *Murchisonia* was consistently nested within *Thysanotus* in all analyses showing a need for the return of both species to *Thysanotus*. Insights to intraspecific variation were also discernable from morphological, molecular and the combined analyses in species such as *T. patersonii* and *T. juncifolius*. Two new *Thysanotus* species, *T. unicipensis* and *T. racemoides* are also described. Our data strongly support the current circumscription of Laxmanniaceae, but suggest that there are three main lineages within the family, rather than the two previously recognised subfamilies.



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