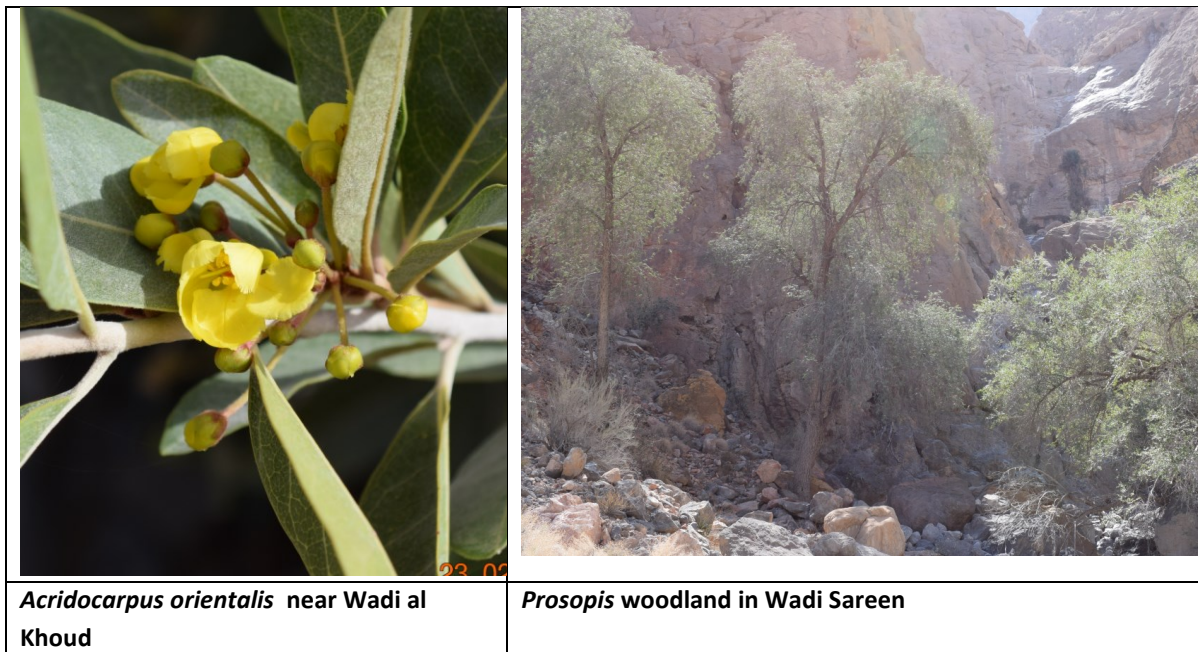


## Leguminosae and Malpighiaceae species diversity in Oman



### Background

The flora of the Arabian Peninsula (including Socotra) is thought to comprise some 3400 species of flowering plants, ferns, fern allies and gymnosperms of which flowering plants account for around 80% of species diversity. Two angiosperm families in particular dominate the flora in terms of species-richness, namely Graminae “The Grasses” and *Leguminosae* “The Legumes”. The two families together represent nearly a third of all the flowering plants in the region and legumes alone number over 350 species. The *Malpighiaceae*, in contrast to the legumes, has only very limited representation in the region with just two species confirmed to occur there. *Acridocarpus socotranus* is endemic to Socotra and *Acridocarpus orientalis* is recorded from Oman. The *Flora of the Arabian Peninsula and Socotra* which is being written and edited at RBGE ultimately will comprise six volumes. Volume 1 and Volume 5 part two (the Grasses) are already published. Volume 2 (in prep.) will contain over 750 species in 20 families including both *Leguminosae* and *Malpighiaceae*.

### Leguminosae research

Since 2008, I have been contracted (1 day a week) by RBG Edinburgh to write a taxonomic account of the *Leguminosae* for the *Flora of the Arabian Peninsula and Socotra* (FAPS) and have been making steady progress. Having a background in African *Leguminosae* floristics

has been very useful in preparing the FAPS generic accounts, especially since many legumes occur both in Tropical Africa and in the FAPS region. However, the species composition and habitats in which those species occur differ considerably between the two floristic regions.

### Acridocarpus research

Malpighiaceae (about 1100 species) has a pantropical and warm temperate distribution with species-richness strongly concentrated in the new world. Atypically for the family, the genus *Acridocarpus* (about 30 species) is exclusively old world. Of the two species that occur in the FAPS region, *Acridocarpus socotranus* is endemic to Socotra and *Acridocarpus orientalis* has a widely disjunct distribution in Oman having been recorded from numerous localities throughout the Hajar Mountain range along the north eastern coast of Oman as well as from gatherings made in the Dhofar Mountains in the extreme south (See Map). In 2011, an RBGE MSc project undertaken by Ghudaina Al Issai, Oman Botanic Garden (OBG) supervised by myself and Dr Sabina Knees provided morphological evidence that these two populations may not be conspecific.



Map showing distribution of *Acridocarpus* in the Arabian Peninsula. Blue triangles indicate the Hajar Mountain populations of *Acridocarpus*; blue squares indicate the Dhofar Mountain populations; blue circles represent *Acridocarpus socotranus*.

### Purpose of the fieldwork in Oman

To visit the Hajar Mountain range in the north and the Dhofar Mountains in the south to make targeted field collections and comparative field observations of *Leguminosae* and of *Acridocarpus*. Fieldwork in the north to be undertaken in collaboration with, and with logistical support from, Oman Botanic Gardens (OBG). Fieldwork in the south to be undertaken in collaboration with, and with logistical support from, EarthWatch Oman.

To ground truth species accounts of *Leguminosae* completed so far for *The Flora of the Arabian Peninsula and Socotra*.

To study herbarium holdings of Legumes and *Acridocarpus* at OBG and whilst there to consult with co-author Ghudaina Al Issai (OBG) on our joint *Acridocarpus* mss.

### Timetable during fieldwork visit

18-20/2/2015. Oman Botanic Gardens. Studied OBG herbarium holdings of *Leguminosae* and *Acridocarpus*. Also examined and where needed determined new accessions of *Leguminosae* and *Acridocarpus*. Along with Dr. Sabina Knees, met with Ghudaina Al Issai to discuss our joint *Acridocarpus* study and spent some time among the in-country accessions collections in the plant nursery at OBG making habit and colour observations of various *Acridocarpus* accessions as well as providing identifications of a few *Leguminosae* accessions. Preparing for field work.

21-26/2/2015. Fieldwork localities/habitats in Northern Oman

Wadi al Khoud – a gravelly wadi with almost permanent water pools in some places

Lizugh - Lizugh Falaj – a mixed old cultivation in a shaded, irrigated area

Wadi Bani Kharis – a steep sided rocky wadi, seasonally flooded watercourse

Wadi Bani Awf – a steep sided wadi, small semi-permanent watercourse with moderate vegetation cover including many individuals of *Dalbergia sisoo*

Wadi Sareen Nature Reserve – a very steep sided wadi, with water seepage and boulders at base, small *Prosopis* “woodland” area.

27/2 Travelling between North and South Oman

28/2-02/3/2015 Fieldwork localities/habitats in Southern Oman

Dhofar: Titam – Ayun – a dry, west facing wadi edged by grassy slopes

Dhofar: Jabal Samhan – area of *Anogeissus dhofarica* woodland and *Dracena serrulata* scrubland

Dhofar: Jibja – a heavily grazed, formerly grassy plain area

Dhofar: Taiq Cave – at shallow sided part of wadi around sink hole, semi-permanent water flow and high water table

In total, 173 field observations were recorded (data in Padme Arabia) and 23 collections made (data in Padme Arabia).

### **Outcomes**

- Existing legume accounts for the *Flora of the Arabian Peninsula and Socotra* accounts of *Leguminosae* have been reviewed with reference to information collected during the course of the fieldwork. In particular additional distribution points were added for species of *Crotalaria* and *Tephrosia*. Previously unrecorded habitat preferences for *Dalbergia sisoo* were observed and several new collections made. *Pithecellobium dulce*, a legume tree species, native to the new world was observed and gathered in Oman for the first time (as far as we know).
- New botanical records were transmitted to EarthWatch Oman to assist their vegetation surveys of Jabal Al Akhdar (Hajar Mts.) and Jabal Samhan (Dhofar Mts.). In addition, I assisted Dr Sabina Knees in creating an inventory, at the request of Earthwatch Oman, of the plants of the Lizugh Falaj
- New data was gathered and have added to our manuscript exploring *Acridocarpus* diversity in Arabia. Observations of individuals in cultivation at OBG provided more details concerning habit and fruit differences between the northerly and southerly *Acridocarpus* populations. Regrettably, the manuscript is still not submitted for publication following a decision (post Oman) to take up the opportunity to investigate habitat differences using GIS. That lead to an expansion of the discussion in the paper how the general biogeography of the Arabian Peninsula links to the phylogenetics and ultimately the speciation of *Acridocarpus* in the region. That part is written now (largely by Dr Sabina Knees) and the next step is to send the completed mss. for final review prior to submission to the two non RBGE co-authors namely are Ghudaina Al Issai (OBG) and Prof. Charles Davis (Harvard Univ.).
- Additional locality data for the assessment of Arabian *Acridocarpus* spp has been sent to Prof. Charles Davis who co-ordinates *Acridocarpus* species level red data assessments for IUCN.
- The *Flora of the Arabian Peninsula and Socotra* account of Malphigaceae has been edited to include habit and morphology observations of *Acridocarpus* made during the course of the fieldwork.
- Duplicated herbarium material has been deposited in RBGE and OBG herbaria and silica-dried leaf samples are deposited at RBGE for future DNA (or other) studies.

- Finally, and personally very importantly, my 12 days fieldwork in Oman enabled me to make a significant leap forward in my understanding of the flora in terms of morphology, common plant habits, habitat, ecology, economic uses and threats.

### **Acknowledgements**

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