

The ethnobotany, contemporary uses, chemistry and pharmacology of *Thesium* (Santalaceae)

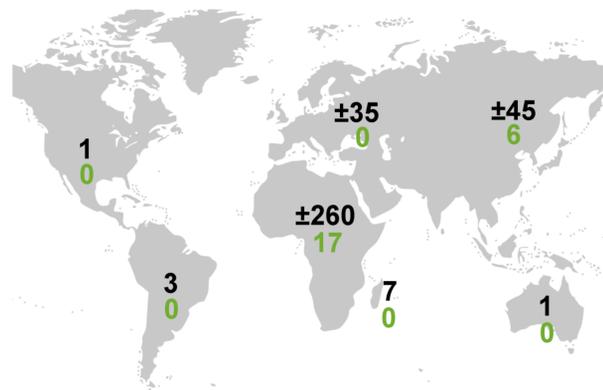
Natasha Lombard^{a,b}, Ben-Erik van Wyk^b, M. Marianne le Roux^{a,b}

^aFoundational Biodiversity Science Division, South African National Biodiversity Institute, Pretoria, South Africa

^bDepartment of Botany and Plant Biotechnology, University of Johannesburg, Auckland Park, South Africa

Introduction

- Thesium* L. is a genus of hemi-parasitic plants in the family Santalaceae, with approximately 350 species occurring world-wide (Fig. 1).
- Several species play important roles in communities around the globe, as amongst others, food and commercial medicines (e.g., *T. chinense* Turcz.).
- No attempt has yet been made to review the available ethnobotanical and ethnopharmacological literature.
- The economic importance and commercial potential of the genus remains mostly unexplored.



Thesium species = ±350
Thesium species with uses = 23

Figure 1. The geographic distribution of all *Thesium* species (in black), as well as *Thesium* species with traditional and contemporary uses (in green).

Aims

- To provide a comprehensive literature review on the ethnobotany, contemporary uses, chemistry and pharmacology of *Thesium*.
- To give insights into possible future research opportunities.

Methods

- Relevant literature was gathered from standard search engines (e.g., Google, PubMed) using the phrase *Thesium* and generic synonyms, as well as from books, theses, patents and herbarium specimen information.
- Recorded uses were divided into ten use categories, and medicinal uses divided into ten subcategories (ailments).

Results and Discussion

Ethnobotany and contemporary uses

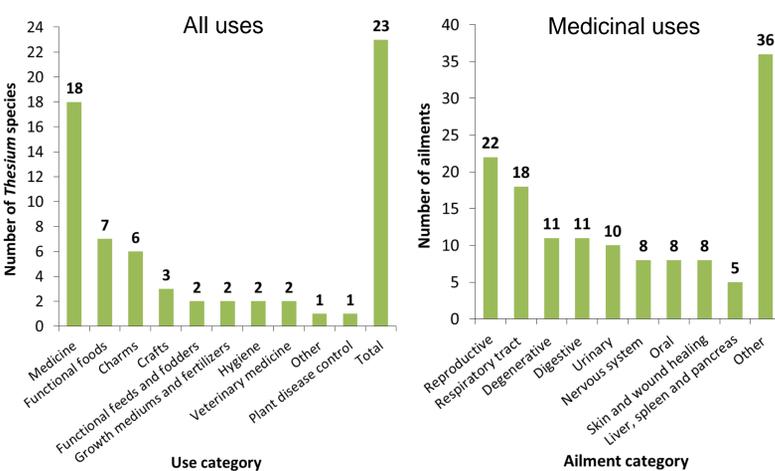


Figure 2. Ethnobotanical and contemporary uses of *Thesium* species in all parts of the world, arranged according to ten different use categories.

Figure 3. The numbers of medical ailments treated with *Thesium* species in each of ten ailment categories.

- Three vernacular names and three uses were recorded for the first time for *T. fastigiatum* A.W.Hill, *T. junceum* Bernh. and *T. stuhlmannii* Engl.
- A total of 23 *Thesium* species have traditional and contemporary uses.
- They are mainly used as medicines (Fig. 2) to treat 137 ailments (Fig. 3), often reproductive and respiratory related ailments.
- Species with uses are entirely restricted to Africa and Asia (Fig. 1) with a large difference in use between the two continents (Fig. 4).
- Two Asian species, *T. chinense* and *T. longifolium* Turcz., are used commercially, but no African species.
- Thesium chinense* is included in ca. 175 Asian patents.

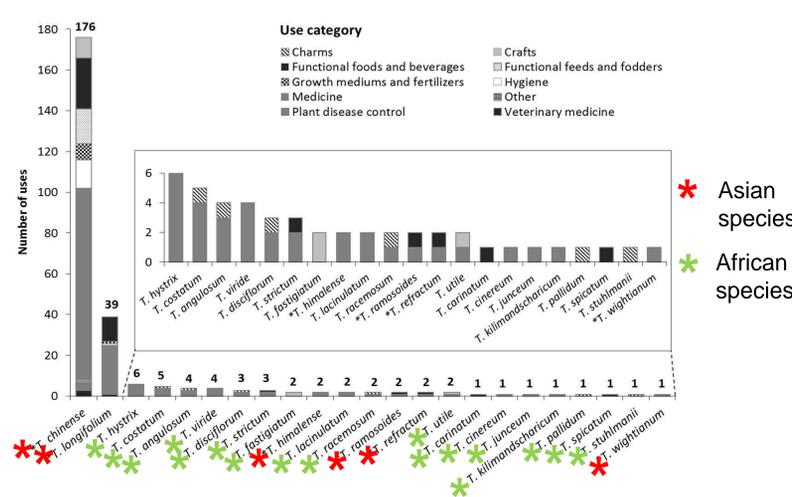


Figure 4. The total number of ethnobotanical and contemporary uses (values above each bar) for 23 *Thesium* species, as well as the proportion of applications from ten different categories of use (shown by different shades)

Chemistry

- More than 70 compounds have been isolated from eight *Thesium* species.
- The main known compound classes are (also see Fig. 5):
 - Phenolics (flavanones, flavones, flavonols and phenylpropanoids).
 - Fatty acids (acetylenic, saturated and unsaturated).
 - Alkaloids (pyrrolizidine and quinolizidine).

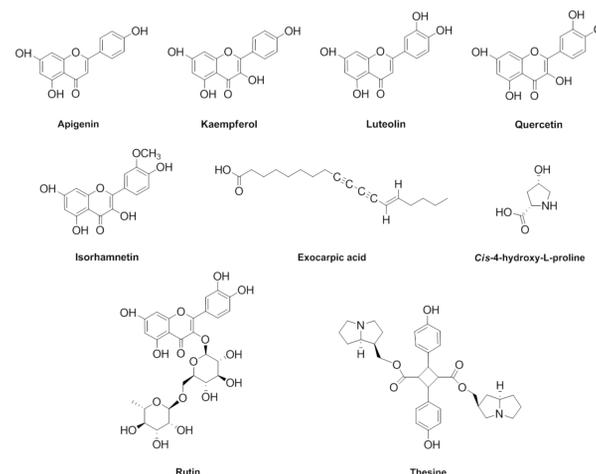


Figure 5. Chemical structures of common compounds isolated from *Thesium* species.

Pharmacology

- Pharmacology of only two species, *T. chinense* and *T. viride* A.W.Hill is known.
- Pharmacological activities include:
 - Analgesic
 - Anti-bacterial
 - Anti-inflammatory
 - Anti-oxidant
 - Chemopreventive
 - Cytotoxic
 - Poisonous
- Therapeutic compounds are flavonoids and phenolic acids.

Conclusions

- There is substantial scope for new scientific and developmental work to be done on *Thesium*, especially on the African species, against the background of the widely traded and scientifically well-known *T. chinense*. The information presented in this review offers baseline data for such much-needed future studies.

Future research opportunities

- Future research priorities include investigations on:
 - The identity and traditional uses of ethnobotanically relevant *Thesium* species.
 - Phytochemistry and chemosystematics.
 - Parasite-host relationships.
 - Pharmacology and pharmacokinetics, including clinical experiments and toxicity studies.
 - Crop development, to explore methods of sustainable production of raw materials as is already done with *T. chinense*.
 - Product development, to create new medicinal and functional food products.



Thesium confine



Thesium racemosum



Thesium chinense

