Towards a comprehensive inventory of medicinal plants in southern Africa

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Introduction

Southern Africa (Figure 1) is known for its biological and cultural diversity. It is home to +/- 24 000 plant species, of which 36,6% are endemic[1]. Two decades have passed since the last checklist of medicinal plants for southern Africa has been compiled by Arnold *et al.* (2002). Therefore, a comprehensive and up-to-date inventory and analysis of medicinal plants for southern Africa will be of considerable academic and practical interest.

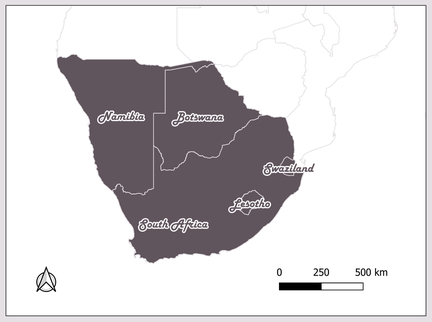

Figure 1: Countries that are included in the Flora of southern Africa region (FSA)

Aims

- To create an up-to-date checklist of medicinal plants that have recorded uses in southern Africa.
- To determine the number of newly recorded species/ taxa in the last 20 years.
- To compare this checklist with previous studies:
  - A medicinal checklist for FSA created in 2002
  - A regression analysis done by Douwes *et al.* (2008) where the checklist of 2002 was used.

Methods

- A checklist of all vascular medicinal plants was compiled for the Flora of southern Africa (FSA) region and arranged alphabetically by order, family and genus
- Calculations for the number of taxa and species were done by using Microsoft Excel software.
- To determine the association between the medicinal taxa (grouped by order) and the total number of taxa available (grouped by order) in the FSA region, a least squares linear regression analysis was applied.
- Microsoft Excel was used to calculate all the regression statistics.
- The results were compared to a similar study done in 2008 where the Arnold et al. (2002) checklist was used[3].

Results & discussion

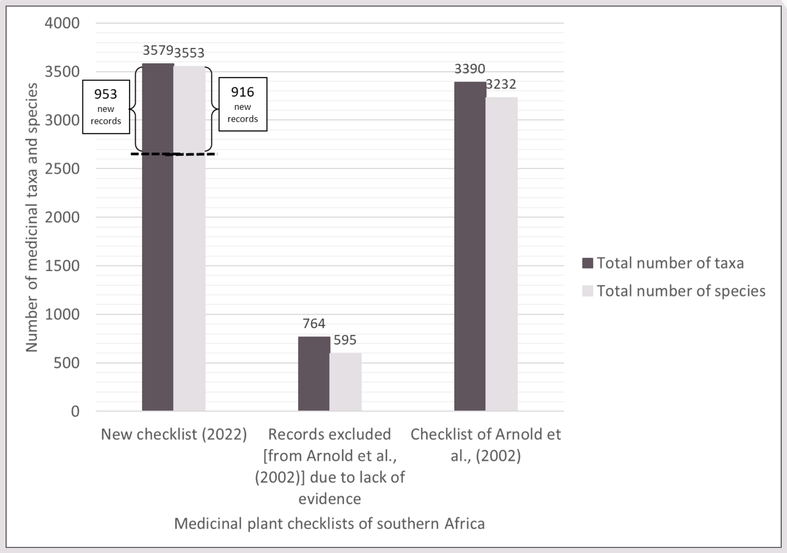

Figure 2: Comparison of the number of medicinal taxa and species of the new checklist (2022) vs the checklist of Arnold *et al.,* (2002)

- A total number of 3579 medicinal taxa and 3553 medicinal species have been recorded.
- There are 953 new taxa and 916 new species compared to the checklist of Arnold *et al.,* (2002).
- 764 taxa (595 species) present in Arnold et al., (2002) were excluded due to a lack of evidence that they are actually used in southern Africa.
- The largest medicinal plant families (2022) are Asteraceae, Fabaceae, Apocynaceae, Euphorbiaceae, Asphodelaceae, Malvaceae, Lamiaceae, Poaceae, Rutaceae and Rubiaceae (Figure 3).

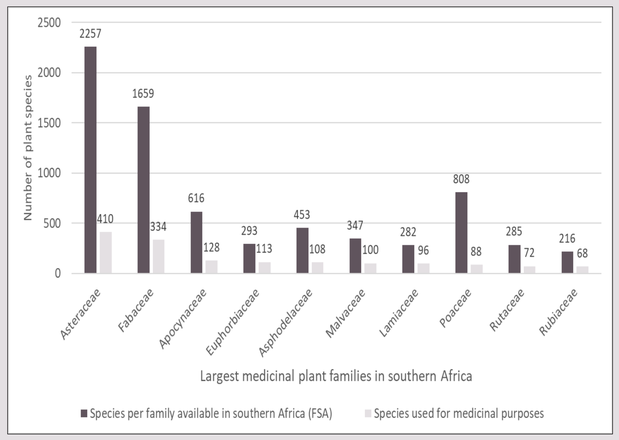

Figure 3: The largest medicinal plant families in southern Africa and the number of medicinal species in each

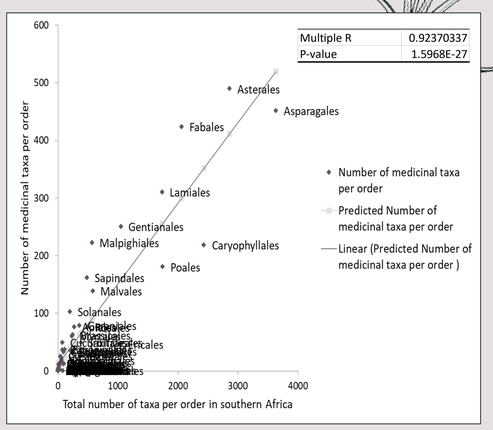

Figure 4: Scatterplot of the number of medicinal taxa (grouped by order) and the number of total taxa of FSA (grouped by order) as independent variable.

- The regression analysis indicated a strong relationship between medicinal taxa (grouped by order) and the total number of taxa in those orders (Figure 4). This means that the availability of taxa in a region could influence whether these taxa will be used for medicinal purposes.
- The correlation is statistically significant due to the low p-value (1.597E-27) (Figure 4).
- Orders with significantly more medicinal taxa or significantly less medicinal taxa (i.e., outliers) than predicted include: Malpighiales, Fabales, Gentianales, Sapindales, Asterales, Solanales, Lamiales, Malvales, Asparagales, Poales, Ericales and Caryophyllales (Figure 4).
- Table 1 shows that the statistics are very similar to Douwes *et al.,* (2008). The R-value (correlation coefficient indicated in the red square) of 0.92 is very close to +1, representing an almost perfect linear correlation. This also corresponds with the R-value of Douwes *et al.,* (2008), which was 0.93.

Table 1: Regression statistics showing the relationship between medicinal taxa (grouped by order) and the total number of taxa (grouped by order). The results are compared to a similar study (Douwes et al., 2008) where the checklist of 2002 was used.

Analyses done on medicinal taxa in 2022 and 2008	Coefficient	Constant	R	R2	S.E.	Population size
Regression analysis by order in 2022	0.140	11.69	0.92	0.85	42.84	64
Regression analysis by order (Douwes et al., 2008)	0.107	9.01	0.93	0.86	38.17	55

Conclusion

The data produce evidence of a hitherto incompletely recorded ethnobotanical heritage that is in urgent need of documentation. A fresh perspective is provided regarding new species records and previously unrecorded uses. Even though nearly a 1000 new medicinal taxa has been added to the checklist (and 764 excluded), the strong relationship between available taxa and those that are used medicinally corresponds with the results of previous studies. This is an interesting trend that should be further investigated. The next step will be to analyse the data at the family level and to compare potential differences in medicinal use (including historical versus contemporary uses).

Bibliography

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3. Douwes, E., Crouch, N.R., Edwards, T.J., & Mulholland, D.A. 2008. Regression analyses of southern African ethnomedicinal plants: informing the targeted selection of bioprospecting and pharmacological screening subjects. J. Ethnopharmacol. 119(3):356–364.

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