



Introduction

- Barren patches of land surrounded by flourishing grass (*Stipagrostis ciliata*; *Poaceae*) are found in the Namib desert and are commonly referred to as "fairy circles".
- These unusual circles were first described from the Namib desert in 1971 and have received much attention in recent years, but their origin remains unexplained.
- One of the more recent hypotheses emerging from a high-throughput sequencing approach is that microbial phytopathogens could be involved.
- 'Zone specific' fungi (i.e., fungal species which differ between fairy circles and their matrix) have also been identified in these circles. [1]

Aim

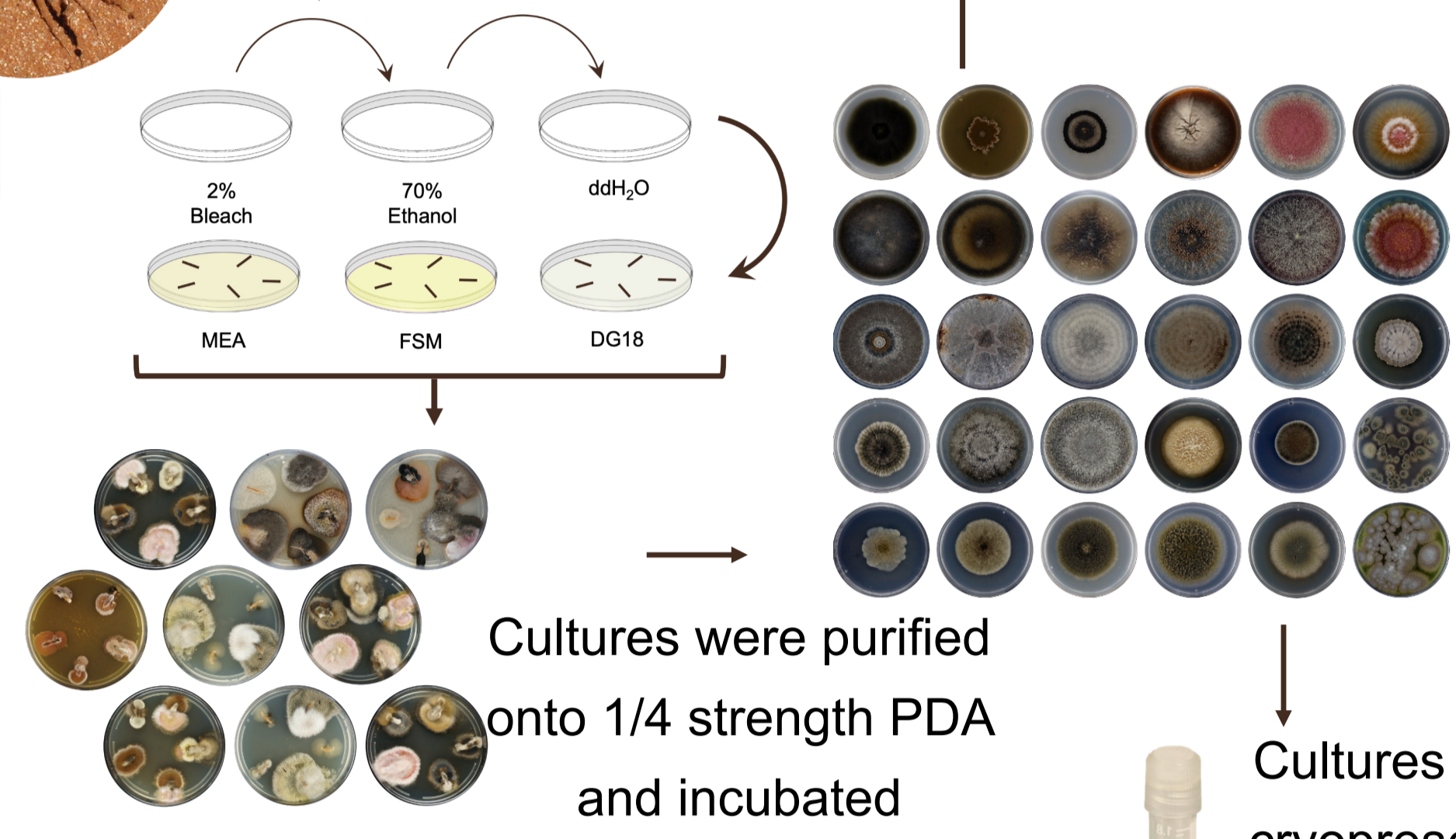
In this study, we considered the culturable diversity of fungi associated with Namib desert fairy circles of two regions.

Materials and methods

Two sampling sites were chosen in Namibia, namely Mirabib and Far East regions.

Stipagrostis ciliata and associated soil samples were taken from the inside and margins of each fairy circle. Matrix samples were also taken in Mirabib.

Plant tissues were surface disinfested and incubated between 1–3 wks, at 19–21 °C



Sequences were assembled and manually edited in Geneious Prime®



Maximum likelihood phylogenetic analyses conducted on *Curvularia* species found.

Results, Discussion and Conclusions

- A total of 487 strains representing 54 genera and 104 species were identified. These included 193 strains from the Mirabib (102 from margin, 91 from inside), 204 from Far East (115 from margins, 89 from insides), and 90 from the matrix.
- The most commonly isolated genera from *Stipagrostis ciliata* were *Curvularia* (n = 75), *Fusarium* (n = 73), and *Monosporascus* (n = 41).
- Twelve species of *Curvularia* were identified. The most common *Curvularia* species identified was *C. moringae* [2] (n = 30), which was described from *Moringa ovalifolia* from the Namib desert.
- Four species of *Curvularia* did not conform to any known species and were considered novel. These species will be described as *Curvularia gobabebensis* prov. nom., *Curvularia maraisii* prov. nom., *Curvularia namibensis* prov. nom., and *Curvularia stipagrosticola* prov. nom.
- Many of the genera isolated contain melanin, or produce chlamydospores, which act as a protection mechanisms, and allow them to persist in these harsh environments.
- This indicates the wealth of fungi that exist and remain to be discovered from the Namib desert and contributes to the current knowledge of the microbes associated with fairy circle grasses.

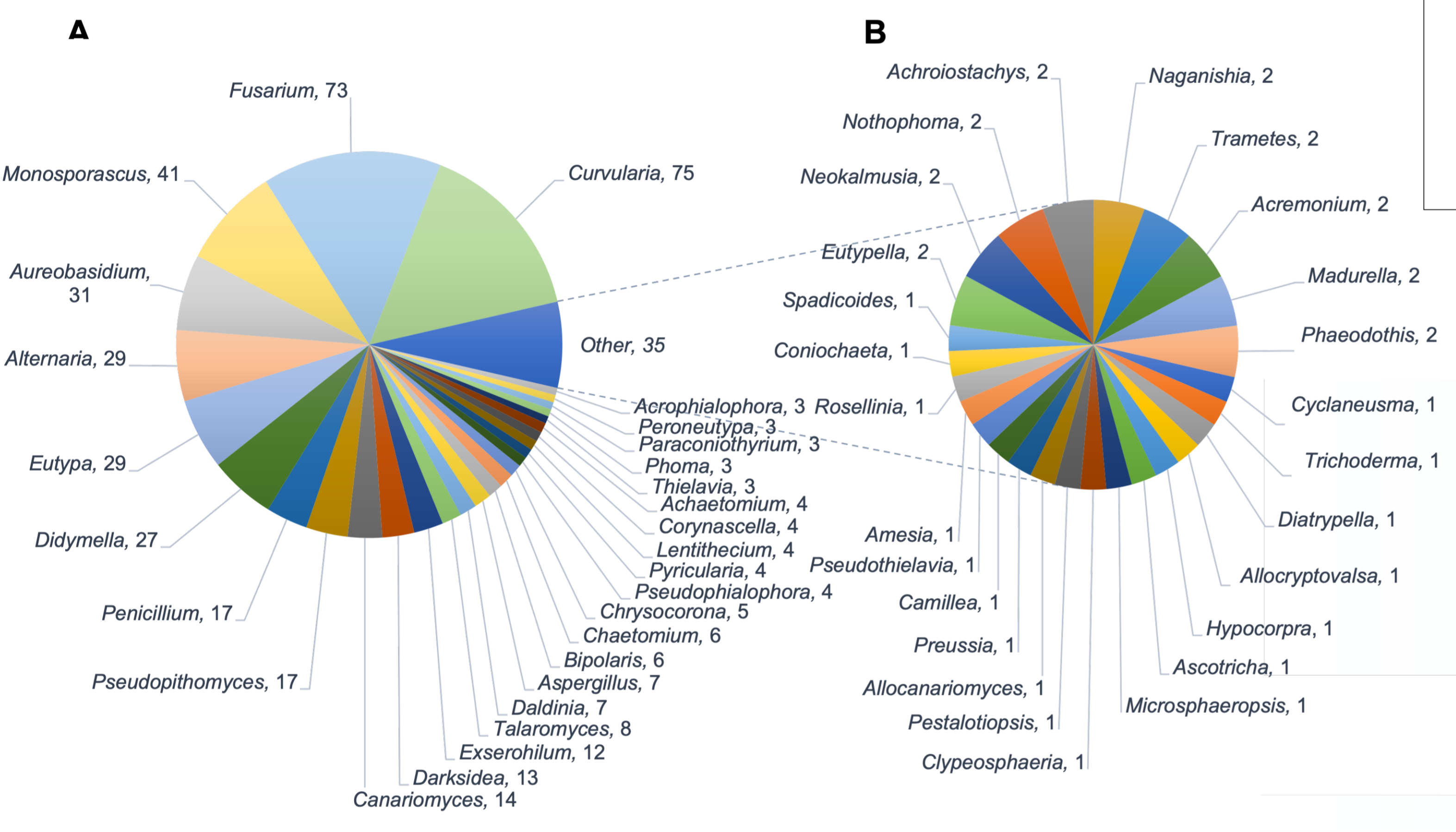
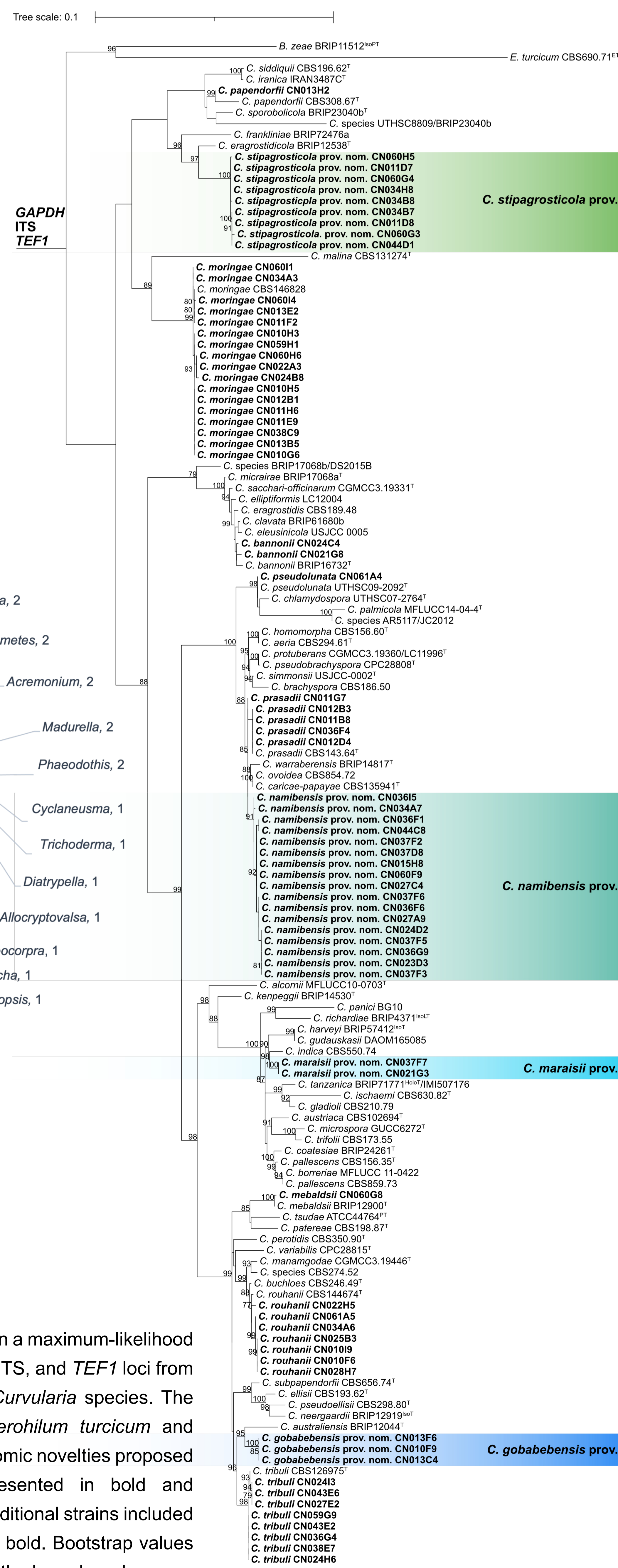


Figure 1
The abundance of fungal genera from Namib desert fairy circles; A: Genera having more than 3 strains; B: Genera having 3 or less strains.

Acknowledgements

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References

- [1] van der Walt AJ et al. (2016) Unique microbial phylotypes in Namib desert dune and gravel plain fairy circle soils. Applied and Environmental Microbiology 82: 4592–4601. <https://doi.org/10.1128/AEM.00844-16>
- [2] Crous PW et al. (2020) Fungal Planet description sheets: 1112–1181. Persoonia 45: 251–409. <https://doi.org/10.1016/j.simyco.2021.100116>

Figure 2

Phylogenetic tree based on a maximum-likelihood approach of the *GAPDH*, *ITS*, and *TEF1* loci from phylogenetically related *Curvularia* species. The tree was rooted to *Exserohilum turcicum* and *Bipolaris zaeae*. The taxonomic novelties proposed in this study are represented in bold and highlighted in blue, and additional strains included in this study are shown in bold. Bootstrap values above 75% are shown on the branch nodes.