



# Do soil microbes drive *Acacia* species invasion in non-native ranges in Australia?

Christina Birnbaum (1, 2) & Michelle R. Leishman (1)

- 1) Macquarie University, Department of Biological Sciences, North Ryde NSW 2109, Australia
- 2) Murdoch University, School of Veterinary and Life Sciences, 90 South Street, Murdoch WA 6150, Australia

Correspondence: Christina Birnbaum, C.Birnbaum@murdoch.edu.au

**Background & Aim:** Australian acacias are one of the most notable invaders worldwide. Across Australian states, acacias became invasive or even naturalized after being introduced to ecosystems outside their natural distribution range. The relative importance of soil biota in their invasion success remains unknown, particularly that of rhizobial and fungal communities. We tested the Enemy Release Hypothesis and the Acquired Mutualism Hypothesis to disentangle the belowground invasion mechanisms that may have assisted in the invasion success of these acacias across Australia.

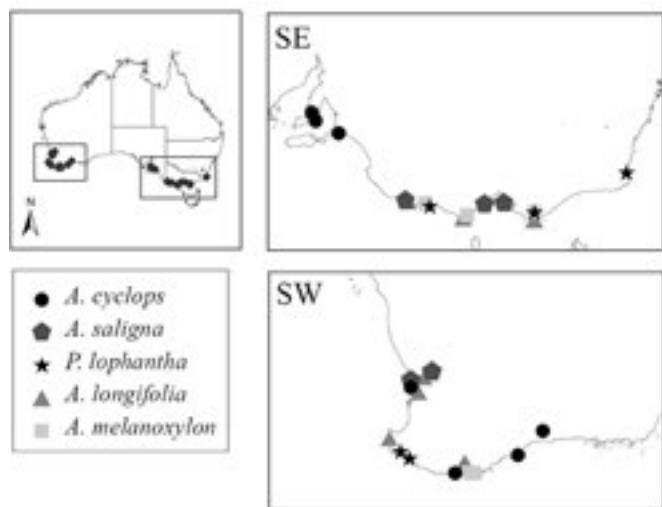
**Materials & Methods:** We examined the role of soil biota on the invasion success of four *Acacia* spp. (*A. cyclops*, *A. longifolia*, *A. melanoxyton* and *A. saligna*) and closely-related *Paraserianthes lophantha* in Australia. Soil and seed samples were collected from five native and five non-native populations of each species in four states (i.e. New South Wales, Victoria, South Australia and Western Australia). To assess the role of soil biota on plant performance we used a plant-soil feedback experiment to measure the net effect of beneficial and detrimental soil microbiota on plant performance. In addition, we used 454 sequencing to identify the nitrogen-fixing bacterial and fungal communities in nodules and soil.

**Main Results:** The plant-soil feedback experiment showed that soil origin had no effect on the performance of these five host species in their non-native range soils (Birnbaum & Leishman 2013). However, seed origin influenced the performance of two species, i.e. *A. cyclops* and *A. saligna*. Overall, 454 sequencing results revealed that geographic location had an effect on fungal, but not on rhizobial composition. Rhizobial and mainly fungal composition of *A. cyclops* were significantly different from the other four host species suggesting that this species encounters and plausibly associates with different soil microbiota compared to other acacias (Birnbaum et al. 2014). In conclusion, our results suggest that soil biota are unlikely to have impacted on the invasion success of these five species in Australia.

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## References

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- Birnbaum, C. & Leishman, M.R. 2013. Plant-soil feedbacks do not explain invasion success of *Acacia* species in introduced range populations in Australia. *Biological Invasions* 15: 2609–2625.



(Left) Locations of the native and non-native populations where seed and soil samples were collected for *Acacia cyclops*, *A. saligna*, *A. longifolia*, *A. melanoxyton* and *Paraserianthes lophantha* in Australia. Source: Birnbaum & Leishman (2013).

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