

Big surprises underground for plant scientists

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The kwongan eco-region in WA's south-west has revealed some amazing plant kingdom secrets to University of Montreal and University of Western Australia scientists.

The kwongan is a type of bushland that is exceptionally rich in terms of biodiversity, despite existing on some of the most infertile soils in the world. Its unique nature enabled researchers to discover that plants used an amazing variety of root strategies to obtain nutrients from these poor soils.

In a study published today in *Nature Plants*, the researchers explain how the plants not only survive but thrive in harsh conditions.

One of the authors, Professor Etienne Laliberté from the University of Montreal said: "In nature, plants growing in infertile land all use almost exactly the same above-ground strategy: they produce very tough leaves that survive for several years. However, up until now the contrasting diversity of what they were doing underground with their roots was unknown."

The findings show that the kwongan contains almost all the plant kingdom's root adaptations, on soils so infertile that any form of agriculture is impossible without adding a phenomenal amount of fertiliser.

"Scientists believe that natural selection should have favoured a single, particularly efficient root strategy for acquiring nutrients, given the extreme infertility of the land," Professor Laliberté said.

"However, contrary to what we see in the foliage, where many different species of plant have adopted the same, efficient strategy of gaining nutrients with their leaves, there is no single miracle solution when it comes to roots in poor soil. Plants living next to one another can use completely different strategies and have just as much success. This came as a surprise to us."

The general perception of the Australian outback as being a bland, empty void couldn't be further from the truth. "Some [plants](#) form symbiotic root relations with fungi and some with bacteria, while others capture and digest insects for the [nutrients](#) that they contain. Moreover, another broad group of species exude organic compounds that increase nutrient availability," said lead author, UWA's Dr Graham Zemunik.

"The Australian kwongan is one of Earth's plant diversity hotspots, just like tropical rainforests. The research team is in fact supporting an initiative to have the kwongan recognised as a UNESCO World Heritage

site for this reason."

The findings, like the kwongan as a whole, are of global importance.

"Ecosystems all around the world are being altered at an alarming rate. In order to protect biodiversity as best as we possibly can, we need to understand how these systems work. To achieve that goal, our study shows that it's important to go beyond what's immediately visible to study what nature has hidden below ground," Dr Zemunik said.

More information: Zemunik G., Lambers H., Turner B.L. et E. Laliberté (2015). Diversity of plant nutrient-acquisition strategies increases during long-term ecosystem development. *Nature Plants*. [nature.com/articles/doi:10.1038/nplants.2015.50](https://doi.org/10.1038/nplants.2015.50)

Provided by University of Western Australia

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