

Bacteria help wattles 're-green' Australia

Re-planting areas cleared of native vegetation is difficult and time consuming, but it is vital to combating salinity and the loss of biodiversity on farms. A CSIRO Plant Industry team has found that a soil bacterium called *Bradyrhizobium* can significantly improve the establishment and growth of wattles, one species planted to assist farmland.

Re-greening Australia

For land managers, replanting with native vegetation is not a simple task. There is a lack of scientific support to assist them that often results in costly and failed tree planting ventures.

Dr Peter Thrall and his team at CSIRO Plant Industry have shown that *Bradyrhizobium* improves the chances of survival and growth rates of young wattles.

Many plants grow in 'symbiotic' relationships with another helpful organism, like a bacterium. It's a mutually beneficial relationship: the plant and organism grow better when together than if they grew separately. The *Bradyrhizobium* has the special task of helping the wattle turn atmospheric nitrogen into available nitrogen in the soil, which then acts as a fertiliser.

In natural ecosystems *Bradyrhizobium* occurs where wattles grow, but it is frequently absent in farmland where re-planting or reseedling with native vegetation may be taking place.

Working in collaboration with the Department of Primary Industries – Victoria, the North Central Catchment Management Authority and Greening



Wattles treated with the bacterium (right) get off to a dramatically better start than those that aren't (left).

Australia Victoria, CSIRO Plant Industry has established a number of large-scale field trials in north-central Victoria. These trials have shown that direct seeding of wattle seed inoculated, or covered, with *Bradyrhizobium* has establishment rates 2 to 5 times better than untreated seed. Glasshouse trials have also demonstrated similar advantages to treated seed.

Other advantages

CSIRO Plant Industry's research has also demonstrated that the presence of wattles growing in symbiosis with helpful *Bradyrhizobium* strains provides benefits to other plants growing nearby, like eucalypts.

This will all help in establishing more complete ecosystems and provide a longer term, sustainable solution.

Useful in saline conditions

Dryland salinity occurs across large areas of Australia and is known to be an expanding problem, causing loss of farming land and reductions in yield and profitability.

Replanting trees is part of a whole farm management approach to tackling dryland salinity. Finding suitable trees that can establish and survive in saline conditions is a significant problem for land managers – not all trees can tolerate such severe condi-

tions. Also, because of the extensive nature of dryland salinity, wide scale tree planting on farmland will be required to help reduce the problem.

Wattle species, fortunately, possess varying degrees of tolerance to saline soils. Tolerance can even differ across individuals within a species, and may vary by geographical region for a particular species.

The next step for Dr Thrall's group is to look into the effect different *Bradyrhizobium* strains will have on the wattle's performance in saline conditions. Through their research they hope to identify salt tolerant *Bradyrhizobium* strains that can be coupled with salt tolerant wattles, giving trees that establish and perform better in saline conditions.

The CSIRO Plant Industry team is currently making arrangements to ensure a *Bradyrhizobium* inoculant will be available by autumn this year. It will be suitable to a range of south-eastern Australian wattle species including some salt tolerant ones.

Prior to planting, the inoculant can be spread over wattle seed used in seedlings nurseries, or in direct seeding, allowing large areas to be replanted cheaply and easily.

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Dr Peter Thrall and a local farmer measure the progress of young *Bradyrhizobium* inoculated wattles.