Native fungi assist the health and rehabilitation of native vegetation

Dr Neale Bougher

Australia's native fungi interlink with flora and fauna to help sustain the health of our natural vegetation. In recent years there has been an increasing interest among conservation bodies and landholders to monitor the diversity and roles of native fungi in vegetation and to recognise where fungi can be used in revegetation.

In the poor soils that dominate much of Australia, mycorrhizal fungi are prevalent and have particularly significant roles in bushland health. Extensive fungal networks transport nutrients and carbon throughout the soil and can act like an extra root system delivering nutrients to plants. Fungi also have roles such as decomposition and nutrient cycling, binding soil, providing food and/or habitat for many animals such as woylies and insects, and buffering plants against some stresses such as disease.

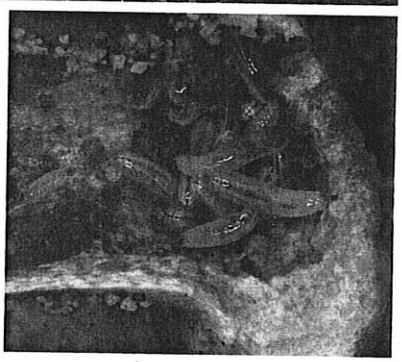
In Australia, hundreds of species of native ectomycorrhizal (mycorrhizal fungi that contact plant roots by enveloping them and penetrating between the cells) fungi partner and benefit many trees and shrubs such as eucalypts, wattles, sheoaks and poison peas. Ectomycorrhizal fungi produce large spore-bearing structures such as mushrooms, toadstools, corals and truffles. In Wheatbelt woodlands fungal fruiting may be briefer and less consistent than in wetter regions.

'Native fungi may take a long time to return to restored vegetation, if they do at all, with subsequent detrimental consequences for long-term viability and biodiversity'.

However, this does not necessarily indicate that fewer fungi are present. In both regions a diverse range of fungal networks may be active below ground. Healthy natural woodlands are likely to have a high diversity of native fungi, but relatively few fungi may be observed by the untrained eye because many of the fungi fruit below the ground or barely emerge. Most species of ectomycorrhizal fungi associated with native Australian plants are unique to Australia. Many of them are yet to be discovered or named. Some of the fungi may be rare, such as those only known from several remnant woodlands in Western Australia.

The 'self-return' of a diversity of fungi can be expected into revegetated areas where the revegetation consists of native plants and is adjacent to substantial areas of remnant vegetation. However, in some other regions with extremely diminished and fragmented natural vegetation such as the central Wheatbelt in WA, few of the native ectomycorrhizal fungi found in remnant bushland are self-returning to revegetated areas on former farmland. Exceptions include some fungi that thrive and persist after disturbance such as the puffball *Pisolithus*. The remaining bank of native fungi in natural vegetation is becoming depleted in the WA Wheatbelt, limiting opportunities for colonisation of fungi from remnants into revegetation. Also, the soil on farms may differ from that of remnant woodlands and may not favour colonisation by many native fungi.

In regions such as parts of the WA Wheatbelt, many native fungi may take a very long time, if ever to return to restored vegetation unaided. Low diversity of native fungi may be detrimental to establishing and maintaining the long-term viability and biodiversity of restored vegetation. If an assessment of native fungi is undertaken and indicates they are not self-returning, these organisms may need to be assisted/or monitored in local vegetation restoration programs – especially if a main goal is to nurture biodiverse native vegetation. Some methods are now available to help promote and monitor the return of local fungi diversity and to avoid pitfalls such as introducing persistent weed fungi (e.g. see Fungibank at www.fungibank.csiro.au)



Top *Many native fungi produce large fruit bodies that can be assessed visually in biological surveys. Pictured are fungi volunteers from DEC's WA Herbarium, Phylis Robertson (left) and Val Preston.*

Above *The fruit bodies of fungi provide food and/or habitat for many animals including the insects shown. Photos — Neale Bougher*

Not all fungi are mycorrhizal; others are decomposers and some cause disease. Confident monitoring and selection of native fungi can best be achieved by attaining at least a basic knowledge of how to recognise some types of fungi. Using local plants is a well-established principle for bush restoration, and this may apply to fungi as well. In some regions of Australia, the natural reservoirs of native fungi may be rapidly depleting, and it may become a race against time to source the fungi before they become locally extinct.