The Ludlow Tuart Forest National Park ,Western Australia. Martin Pritchard

Race to protect WA's last tuarts from extinction

Western Australia is the only place in the world where native tuart trees (*Eucalyptus gomphocephala*) grow, but an unknown cause is killing them. Researchers warn that, within a single generation, the core population of WA's tuart forests could be gone.

Dr Paul Barber of the Tuart Health Research Group, based at Murdoch University, says that since European settlement, tuart forests have reduced from about 110 000 to 30 000 hectares.

His research, based in Yalgorup National Park, about 130 km south of Perth – and home to Australia's largest area of unfragmented tuart woodland – involved the use of satellite images, which showed that tree decline began there in the 1990s and is now escalating and spreading to other areas.

'It's now very difficult to find a healthy tuart tree in Yalgorup. We're looking at the potential for 100 per cent mortality,' said Dr Barber.

After three years of research, Dr Barber has yet to find a definitive cause of the dieback but is narrowing down the range of likely contributors. He has eliminated drought, as well as insects – although they do add to the problem once a tree is affected by dieback. The current focus of the research is underground.

'We have found that many of the root systems of the unhealthy trees lack the fine root mass that healthy trees have,' he said.

'When there is less of that fine root mass, there are less mycorrhizal pads, which are the beneficial fungi that help the tree take up nutrients and water.'

Dr Barber said that a type of *Phytophthora*, the plant pathogen that could cause dieback in jarrah trees, had also recently been found in the tuart trees, but it was still unclear whether it was causing the dieback.

According to Dr Barber, the tuart species is not threatened over its natural range, but tuart ecosystems are under-represented regionally in formal reserves and do not receive sufficient protection management on private lands. The WA Government is, however, completing a strategy and action plan to help conserve, protect and manage native remnant tuart woodlands.

The research group is also coordinating replanting and restoration trials, as well as a seed collection program for future regeneration of the forest once the cause of the dieback is eliminated.

'We've started the seed collection program because we're in danger of losing this genetic resource entirely,' added Dr Barber.

'These trees are becoming so unwell that they are not putting fruit on and are not producing seeds, so we are trying to grab those seeds while we can.'

'Weird' secret life of reefs revealed

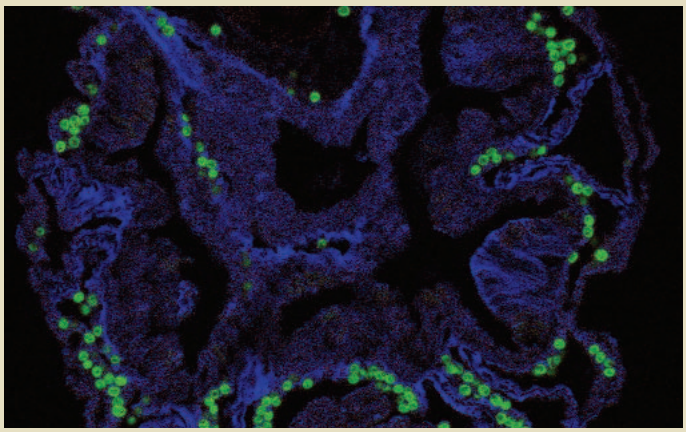
The genetic library of the microscopic algae that feed corals the world over is revealing important clues to improve our understanding of coral bleaching and, ultimately, climate change.

Symbiodinium algae grow within coral tissue and use sunlight to convert carbon dioxide into carbohydrates for the coral to feed on – providing the primary energy source for entire reefs.

However, under stressful levels of heat, light, carbon dioxide or pollutants, corals expel *Symbiodinium*, causing the coral to bleach; if they don't recover the algae within a few days, the corals starve to death.

Scientists at the ARC Centre of Excellence for Coral Reef Studies, James Cook University and the University of Queensland are compiling the world's first detailed gene expression library for *Symbiodinium*. Ultimately they hope to assemble a picture of the 'chemical conversation' that goes on between the corals and their symbiotic plants, which leads to a breakdown in the relationship.

'These microscopic algae are quite weird and unlike any other life form,' says Professor David Yellowlees. 'They have different photosynthetic machinery from all other light-harvesting organisms. They have 100 times more DNA than we do and we have no idea why such a small organism needs so much.'



Fluorescent staining shows up *Symbiodinium* unicells inside a coral polyp. ARC Centre of Excellence for Coral Reef Studies

Because *Symbiodinium* plays a significant role in soaking up CO_2 from the atmosphere, its decline in coral reefs is likely to accelerate CO_2 build-up.