

# Mixed plantings tap soils at two levels

Research has shown that different eucalypt species planted as part of a whole-farm approach to managing waterlogging and salinity in the Western Australian wheat belt help dry the soil in different ways.

Two species monitored – Sydney blue gum (*Eucalyptus saligna*) and river red gum (*E. camaldulensis*) – send roots down to the saturated area just above the water table. The others – yellow gum (*E. leucoxylon*) and coastal mort (*E. platypus*) – extract water from much drier soil nearer the surface. This suggests that mixed plantings may give better results than single-species plots by tapping more of the soil profile.

Katanning farmers Bronte and Peter Rundle planted the four species in strips along contours on their land. They have also adopted other water management initiatives, including installing interceptor drains that channel surplus water to farm dams and planting summer-active pasture species such as lucerne.

A number of CSIRO divisions (Plant Industry, Land and Water, and Forestry and Forest Products), Agriculture Western Australia and the University of Western Australia are collaborating with them in studying the impact of such approaches in controlling waterlogging and dryland salinity in the wheat belt. The aim is to

model the water balance and refine strategies for managing these problems.

Most of the year's rain falls in winter and, as clay restricts infiltration, waterlogging is common then and can cause big reductions in crop yield. Water that escapes below the root zone moves lower in the landscape where it can cause a rise in the water table and increased salinity. Dryland salinity now affects about 9% of the region's arable land, a figure projected to rise to 30% in the next 30 years.

Don White of CSIRO Forestry and Forest Products has found big differences between the eucalypt species in pre-dawn leaf water potential; these show yellow gum and coastal mort experience considerable water stress while Sydney blue gum and river red gum do not. As well as indicating that the latter two species tap groundwater, this finding suggested the species would differ substantially in the amount of water they transpire.

But White's next measurements, of gas exchange by the foliage, indicated that this was not the case. They suggested that the transpiration rate per unit leaf area was virtually the same for all species through most of the year; sap flow measurements are being made to confirm this. As well as demonstrating that the shallower-rooted trees are efficient at extracting water from

the soil, the results indicate that a good estimate of water uptake by a strip of trees can be made from its leaf area, without having to account for species differences.

How do the trees that cannot reach down to the water table maintain their water uptake? White and Dr Neil Turner of CSIRO Plant Industry, found they use two strategies. Their leaf tissue becomes very elastic during the warmer months, allowing growth and gas exchange to continue in quite dry soil. In addition solutes concentrate in their foliage, acting 'like a big salt blotter', White says. 'These trees can extract water from very dry soil that the roots of other plants could not get.'

Because water will be extracted from a range of depths, he sees value in planting mixtures of trees in groundwater recharge areas. Other measurements indicate that the tree strips use more water annually per unit ground area than adjacent clover and lucerne pasture, and show they have dried the soil profile to at least six metres.

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## Keeping sightseers at bay

A STUDY of interactions between wildlife and tourists at Montague Island has provided some common-sense management solutions for the New South Wales National Parks and Wildlife Service.

Montague Island National Park, situated nine kilometres off the coast of Narooma in southern New South Wales, hosts important non-breeding populations of Australian and New Zealand fur-seals, and breeding populations of crested terns and little penguins.

The study, by Peter Shaughnessy and Nick Nicholls of CSIRO Wildlife and Ecology, and Sue Briggs of the National Parks and Wildlife Service, looked at ways of minimising the effect of tourism on these wildlife populations.

Their first conclusion was that tour boats generally did not unduly disturb fur seals hauled out on the rocks. There were exceptions to this, and the study recommended that tour boats approach the colony so that the fur seals can see them.

Giving the penguins personal space proved a little more challenging as some of the birds used the ramp to the jetty for their nightly parade to their burrows. The authors recommended an alternative method of departure for the tourists be developed.

The crested-terns also needed a private place to breed. Providing it involves roping off their breeding ground to prevent tourist access.

'It's pretty straight forward,' Shaughnessy says, 'but the Parks Service requires such information to make the right decisions about wildlife conservation.'

Denis Faye

