New uses for native plants

For much of the past 200 years Australia's native plants were seen as worthless weeds, to be replaced as swiftly as possible by the familiar plants of Europe. Fortunately, that kind of 'botanical cringe' has died out with the realisation that our native plants, having evolved to survive in this harsh continent, are in many situations more appropriate than plants from half a world away.

Native trees and shrubs have become so widely accepted that public and private gardens composed entirely of exotic species are themselves exotic. Native grasses and herbs, however, are generally conspicuous by their absence, and until recently only limited use was made of flowering native plants indoors. But that situation is changing as Australians become more aware of the ornamental and landscaping value of Australian plants.

Landscape architects and transport planners have traditionally relied on a mixture of grasses and herbs as ground cover for open spaces or for roadside plantings. Most of these species are exotic — the New South Wales Roads and Traffic Authority (RTA), for example, uses ryecorn, hulled couch, red and white clover and perennial rye for roadsides — and, although they are fast-growing, they are susceptible to drought (a significant disadvantage in locations that can't be watered regularly), easily invaded by weeds and visually incompatible with native trees and shrubs; also, they only provide patchy coverage.

Dr Richard Groves and colleagues in the CSIRO Division of Plant Industry searched for an alternative: a species that would tolerate low rainfall, resist introduced weeds and grow densely enough to counter erosion, while allowing enough space for native shrubs and trees to establish themselves, and would not need frequent mowing. Importantly, they were also looking for a species that complemented the soft grey-greens of the Australian landscape.

A native grass seemed to be the answer, but native grasses generally produce few seeds — and shed them easily and at irregular intervals, making seed-gathering on a commercial scale difficult and expensive. After a 3-year investigation funded by the then National Capital Development Commission and subsequent field trials supported by RTA, Dr Groves and Mr Mark Lodder developed a variety of *Danthonia richardsonii* (commercially named Hume wallaby grass) that sets seed in commercially viable quantities and at appropriate stages of growth, needs little maintenance, tolerates drought… and, in the words of the 1990 Project Award citation from the Australian Institute of Landscape Architects, has 'an Australian character, while providing habitat for other native flora and fauna'.

Geraldton wax Newport Nurseries

Hume wallaby grass also has the distinction of being the first Australian grass cultivar to be grown for commercial use, and seed will be available (from Heritage Seeds, Melbourne) in 1992. Because the growth of this grass is reduced in summer and winter, the RTA has funded further research by Dr Groves into the development of a suitable cultivar of kangaroo grass (*Themeda australis*) that will produce good summer growth, as well as providing an ideal environment for the potential introduction of native flowering herbs.

Also at the Division of Plant Industry, Mr Iain Dawson and Dr Rod King have been introducing Australians to one of our prettiest native plants in a new setting. Geraldton wax, *Chamelaucium uncinatum*, can grow to 4 metres; its large numbers of small, pink flowers make it a popular garden plant. Mr Dawson, however, has developed a miniature Geraldton wax that grows to only 30–40 cm, producing burgundy, pink, cream or white blossoms for up to 12 weeks — indoors.

The researchers' first task was to confirm that the species could tolerate indoor light, temperature and humidity conditions. They then had to identify the factors that controlled flowering; in the wild, Geraldton wax (first described from the coast of Western Australia) flowers from June to October, with a peak in July and August. They also had to perfect propagation of plants from cuttings, as plants grown from seed are too variable and tissue culture produces a long-term juvenile plant that takes 1–2 years to flower. Once plants were established, the researchers used growth hormones to regulate their size and specific growing conditions (notably, limited day-length) to encourage flowering and to provide a steady supply of flowering plants — which can be disposed of or planted out in the garden when they have finished flowering.

Grown under licence by Newport Nurseries as 'Honey Wax' and available from nurseries, garden shops and supermarkets, the miniature Geraldton wax is attracting increasing interest from retailers and from overseas growers of ornamental plants.

Bay health study

An ambitious environmental research project under way in Melbourne seeks to determine the health of Port Phillip Bay. The $10 million 5-year project has been designed by a team of CSIRO scientists in conjunction with staff from Victorian government agencies.

Commissioned by Melbourne Water, the project will investigate in detail the water quality of the bay (including the level of contamination by toxic chemicals), determine its capacity to assimilate nutrients now and in the future and assess the health of fish living in it.

Port Phillip Bay is a large but relatively shallow and almost entirely closed body of water. Because of poor exchange of water with Bass Strait, it has a limited capacity for assimilating the growing amounts of sewage, industrial waste and urban run-off discharged by the city.

The Victorian Environment Protection Authority says the state of the bay is 'generally good', but has concern about the future impact of nutrients and the possible formation of major algal blooms.

Throughout the project, the CSIRO team — headed by Dr Chris Crossland of the Institute of Natural Resources and Environment — expects to be involved in a wide range of tasks, including a study of the movement of effluent from the Werribee sewage farm and determination of the amount of nutrients, such as nitrogen and phosphorus, that flow into the bay after storms.

The investigators will also undertake a toxicant-monitoring program near the sewage farm, in the Yarra and Werribee Rivers and in Mordialloc Creek on the Mornington Peninsula. The program will measure trends in the levels of toxic chemicals in mussels, fish and sediments. It will monitor a variety of chemicals including metals such as chromium, lead and mercury, and organic compounds like dioxin, PCBs, chlorophenols, polycyclic aromatic hydrocarbons, pesticides and the common herbicide 2,4-D.

Dr Leon Collett, manager of Melbourne Water's Port Phillip Bay Environment Division, said the ultimate purpose of the project was to achieve 'a better fit between the bay and its catchment'.

He said there was a need for detailed information that could be used for making management decisions about the bay's future.

Battling bushfires by computer

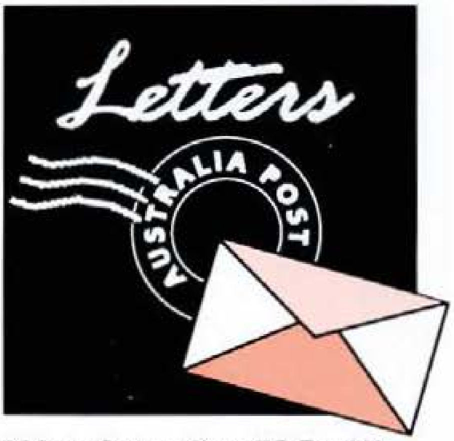
'Fighting' a raging bushfire on a computer screen could be seen as the ultimate in masochistic entertainment, but to the thousands of professionals and volunteers who do battle each year with potentially disastrous bushfires throughout Australia, the opportunity to hone their skills in safety and comfort represents a rare blessing.

Not only would a computer-driven bushfire help teach firefighters the best tactics without exposing them to danger, but it would also give novice and experienced firefighters alike the chance to see how the real thing behaves during peak danger periods — at precisely that time when a practice fire is impossible.

Dr Tom Beer and Mr John Coleman, of the CSIRO Division of Forestry Bushfire Research Group, have developed a National Bushfire Model that predicts, on a portable computer, the spread, shape and behaviour of bushfires in a variety of landscapes and displays fire patterns together with vegetation types, roads, water and resources (such as settlements) under threat.

The model gives firefighters reliable, precise information on a bushfire's path, its flame height, intensity and rate of spread and the behaviour of flanking fires, based on digitised maps and 'real time' weather reports. The Bushfire Research Group recently received a $107 000 contract from the Australian Association of Rural Fire Authorities to develop the model, which is to be introduced into the Association's training exercises for planning fire suppression strategies.

Continuing research aims at improving the model's performance in providing an accurate image of fire behaviour — without exposing firefighters to danger during training sessions — and assisting fire controllers with the suppression of fires so that equipment and manpower are used to maximum effect.



Write to Letters, Ecos, PO Box 225, Dickson, ACT 2602.

Water mixing

I could hardly believe my eyes when, skimming through the winter issue of your excellent publication, I came across page 7, with its 3-D representation of temperatures in the sea suggesting that water at 2° C is denser than water at 4°C.

Variation of water density with temperature is of particular interest to me as my consulting work involves designing and operating lake and reservoir mixing systems to break down thermal stratification. The mixing maintains well oxygenated conditions through the full depth of the water body, and this controls the many water quality problems generated by low-oxygen, reducing conditions at the sediment/water interface — e.g. the currently popular one of toxic blue-green algal blooms.

For this mixing I use an air compressor to bubble air up from the bottom; this is turned on and off automatically by temperature probes in the water body that detect when the degree of thermal stratification is critical.

I have successfully mixed many lakes and reservoirs of all sizes throughout Australia over the past 15 years, and am working at present on Rocky Valley Dam on the Bogong High Plains. This has two periods of water quality problems produced by thermal stratification — summer when the surface water warms, and winter when it cools below 4°C and freezes over.

Due to water becoming less dense as it cools below 4°C, this colder winter water rises towards the surface. On the other hand, water also becomes less dense as it increases in temperature above 4°C, and this warmer water in summer rises towards the surface. The winter thermal gradient is therefore the reverse of that in the summer, and this has to be taken into account in the design of an automatic control system to detect and correct critical thermal stratification throughout the year.

Frank L. Burns
Glen Waverley, Vic.

The shading in our diagram, from dark blue for the coldest water to pale blue for the warmest, was not intended to represent variation in water density.