

# Fading bush-tucker genes

You may be surprised to hear that mungbeans are more Australian than pie and sauce. And not just because we eat a lot of them — as bean sprouts — at Asian restaurants. Unlike the beef, wheat, and tomatoes that make up our 'national dish', mungbeans are native to Australia.

In fact, historical and contemporary evidence suggests that Australia's wild mungbean (*Vigna radiata* ssp. *sublobata*), and four other species of the genus, have been eaten by Aborigines for thousands of years.

According to Ms Alison Cottrell of the Department of Anthropology and Sociology in the University of Queensland, the numerous local names given to the wild mungbean — 'gabala', 'kadolo' ('kerdolo'), 'komin', and 'umida' — reflect its widespread use as bush food.

In addition to the young pods, which are crisp and pleasantly sweet-tasting like ordinary garden beans, some forms of the mungbean (and its close relatives) produce a fleshy root with the texture of parsnip. These are usually baked before eating.

With a dry weight of 30–60% carbohydrate, 30–50% fibre, and 5–7% protein, plus a range of minerals, vitamin C, and thiamine, the fresh tubers would sit well on the shelf of

any health-food shop. But apart from their importance as nutritious tucker, the tuberous roots have a valuable physiological function that helps them regenerate rapidly after extreme environmental disturbance — fire, for example.

Tuberous roots, and other traits present in some of Australia's wild mungbeans — a hard seed-coat, tolerance to saline and alkaline soils and cool weather, and resistance to local diseases — are of more than passing interest. Dr Bob Lawn and Dr Bruce Imrie, of CSIRO's Division of Tropical Crops and Pastures, supported by the mungbean industry, have been incorporating some of these adaptive characteristics into new varieties of the cultivated mungbean, *Vigna radiata* ssp. *radiata*, a close relative of the wild plant and probably a derivative.

Although farmers right across Asia have grown mungbeans for hundreds of years, Australia's venture into growing the plant commercially is relatively recent. Interest is increasing — last year our farmers grew about 30 000 ha — but their use of Asian varieties is causing some teething troubles.

Most serious is the introduced cultivars' susceptibility to weather

damage following rain late in the season; some seeds in the pods germinate making them vulnerable to fungal attack. Contributing to the problem is the tendency for the pods on a plant (and often individual plants in a crop) to mature at different times.

These characteristics, which evolved, no doubt, in response to the selection pressure from subsistence farmers' manual harvesting and their preference for seeds that sprout easily, are undesirable for Australian climatic conditions and mechanised cropping. By contrast, selection pressure on the characteristics of Australia's wild mungbean — enhanced, perhaps, by the Aboriginal use of fire — has encouraged the development of a hard seed-coat that resists water absorption.

Bob Lawn and his colleagues have found that a hard seed-coat is attributable to a single major gene that can be readily introduced into the commercial cultivars. With this trait present, a crop of mungbeans is much better suited to Australia's intensive agricultural management. Heating the seeds in warm water is all that is necessary to make them ready for sprouting.

As mentioned earlier, the various potentially valuable characteristics of Australia's wild mungbean include tuberous roots, found only recently by Bob Lawn in speargrass country near Townsville. Possession of these roots effectively changes the plant to a perennial, a feature that would make it useful as a subtropical pasture legume.

Although modern agriculture has much to gain from preserving the gene pool of the wild plant, paradoxically farming and grazing, along

with urban development, are helping to limit its distribution. Dr Lawn is concerned that the natural occurrence of our wild mungbean — and with it its genetic diversity — is contracting.

For example, on recent field trips to the Conondale region north of Brisbane, where improved pastures have been sown, he found no trace of the plant. It also seems to have disappeared from Bribie Island following tourist development there. And the limestone hills where Leichhardt first collected specimens are now in the heart of Ipswich!

Disappearance is not the only problem. Dr Lawn says that, unfortunately, the natural diversity in the wild populations will be progressively 'corrupted' by the natural out-crossing of genes from the cultivated mungbean as the crop expands into areas where the wild plants occur (such as the Ord, the Douglas-Daly region of the Northern Territory, and the Burdekin and Emerald irrigation areas of Queensland).

Given that practically all of our agricultural crops are introduced species, it seems ironic that we may be eroding — albeit unwittingly — a rich source of adaptive characteristics of a commercially important plant indigenous to Australia.

David Brett

The original wild mungbean specimen collected by Sir Joseph Banks at Endeavour River in 1770 (British Museum photograph).

