

**Australian Food Plants Study Group
ANPSA - Australian Native Plants Society (Australia)**

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**Bushfood Conference Saturday 27th November at ATAC. <http://atac.qld.edu.au/>
4808-4822 Mt Lindesay Hwy, North Maclean Qld. Cost around \$60.00 includes
morning tea, lunch and membership to the Qld Bushfood Association. More detail
to follow. Note your calendar. (UPDATED: Conference is now 27th 28th May 2023)**



Backhousia citriodora, *Syzygium australe* (Aussie Southern) & *Acacia neriifolia*

Photo by member Colleen Keena – Lockyer Valley Qld

THE SHINY-LEAVED COONDOO *PLANCHONELLA EERWAH*

by Glenn Leiper¹ and Peter Woodall²

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Introduction

The Shiny-leaved Condoos *Planchonella eerwah*, also known as Flinders Plum, Black Plum and Wild Apple, is a medium sized tree of dry rainforest and is endemic to south-east Queensland. It is listed as “Endangered” under both Queensland and Australian legislation.

Discovery

The Field Naturalists’ Section of the Royal Society of Queensland had an excursion to Eumundi over Easter 1894. F.M. Bailey read an account of this excursion to the Society on 21 April 1894 in which he mentioned that two new species of trees had been encountered. One was *Elaeocarpus eumundi* and the second was a species of *Sideroxylon* “which having been met with upon Mount Eerwah, has been named *S. eerwah*” (Bailey 1894).

Taxonomy

This tree has had a number of name changes since its first discovery by F.M. Bailey.

Bailey (1894) named it *Sideroxylon eerwah* after Mt Eerwah, where he found it, west of Eumundi. Domin (1928) placed it in the genus *Sersalisia*, fourteen years later Baehni (1942) placed it in *Pouteria* and subsequently Royen (1957) placed it in *Planchonella*. Over thirty years later, Pennington (1991), using morphological characters, combined the genus *Planchonella* with *Pouteria*. *Pouteria* became a large genus of nine sections and 325 species and this tree became *Pouteria eerwah*.

However, Triono *et al.* (2007) used molecular data to investigate the phylogeny of *Pouteria* and found that *Pouteria* was not monophyletic and contained three major lineages, thus arguing against the combination of *Planchonella* with *Pouteria* by Pennington. One of these clades or lineages (A) contained most of the species previously in *Planchonella* including *eerwah*. They also found that *Planchonella eerwah* was close to two other species: *Planchonella cotinifolia* (found from the Wenlock River, Queensland to the Richmond River, New South Wales) and *Planchonella australis* (south-east Queensland and eastern New South Wales) forming a clade A₁.

Most authorities now name the tree *Planchonella eerwah* (Australasian Virtual Herbarium in Atlas of Living Australia) with the name given as *Planchonella eerwah* (F.M. Bailey) P. Royen, showing that Bailey was the first to describe it and Royen was the first to place it in the genus *Planchonella*.

Description

Planchonella eerwah (Shiny-leaved Condoos) is a straight tree to at least 15 metres tall in some of the rainforests around Ormeau and Bahrs Scrub, but shorter than that in the drier scrubs around Boonah. In larger specimens, the trunk becomes almost fluted with a degree of buttressing. The bark is grey-brown, scaly rough and longitudinally fissured, and adult specimens tend to stand out amongst other trees because of its quite distinctive bark (Fig. 1). The tree develops a dense dark canopy of shiny thick leaves.

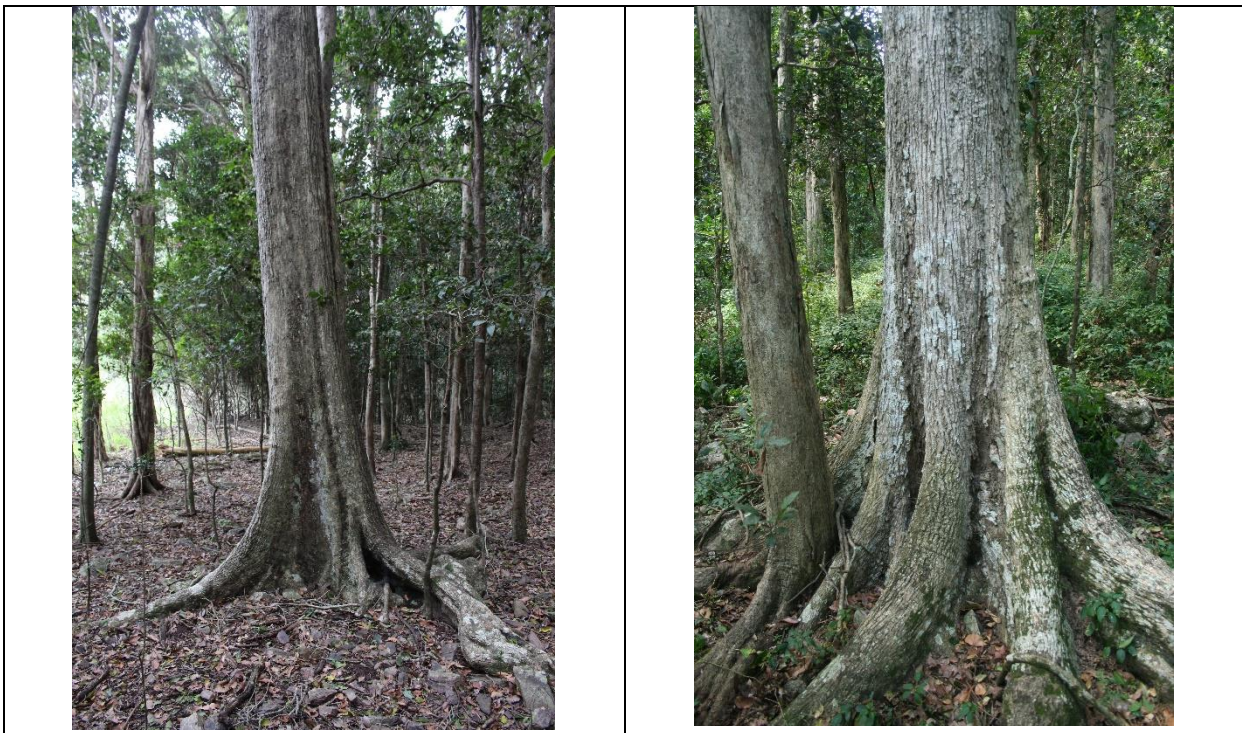


Figure 1. The trunks of *P. eerwah* growing at Bahrs Scrub. Photo: G. Leiper.

The sap is milky and exudes from stems and leaves when broken, although sometimes, especially in drier conditions, it is not so obvious. The cream-green coloured 7 mm flowers are produced either singly or in small clusters from the leaf axils from winter through to summer and produce a light fragrance or odour (Fig. 2). While the flower appears to have about 10 petals, half of these are actually sepals and the others remaining are petals.



Figure 2. Flowers of *P. eerwah*. Photo: G. Leiper.

Fruits are usually oblong, ovoid or slightly pear-shaped, often with a slight curve, and glossy red changing to black as they mature. Fruit can be to 7 cm long and 5 cm wide, and contain up to 5 seeds, and these larger examples are usually found in more coastal areas such as Bahrs Scrub

where annual rainfall is slightly higher. Usually in the drier scrubs around Boonah and Veresdale Scrub, fruits are smaller to about 5 cm long and 3 cm wide with one to two seeds. The fruit's flesh in immature fruit is cream coloured with a slightly stringy-fibrous texture, but as it matures develops a pink to red hue. The texture softens to a somewhat firm texture akin to a paw-paw at times especially after having dropped from the tree, and can be relatively pleasant to eat. The most pleasant tasting flesh is usually directly adjacent to rotting flesh.

As the fruit rot on the ground, the flesh becomes quite hard and withered, but eventually all that is left on the ground are the distinctive shiny brown seeds to about 25 mm long and 13 mm wide, slightly compressed, with a distinctive longitudinal scar characteristic of *Planchonella* species' seeds. These seeds are often inhabited by insect larva that hollow them out (Fig. 3).



Figure 3. Fruit and seeds of *P. eerwah*. Bahrs Scrub. Photo: G. Leiper.



Figure 4. The chewed fruit and seeds of *P. eerwah*. Bahrs Scrub. Photo: G. Leiper.

In most years the trees will produce fruit and in a good fruiting year, the ground under a large tree can be littered with hundreds of these large, colourful fruit ranging in shades of red and maroon through to black. In drier seasons, the tree will start jettisoning fruit early while still red and these will not produce mature seeds. Fruits are usually infested with larva of fruit flies, and in some scrubs the fruit have been chewed by possums and pigs.

Distribution

It has 5 main areas of distribution. In the Boonah district it has been recorded from the dark basalt soils around Coulson, Milbong and Mt French. In the Beenleigh district it has been recorded from the metasediment spurs of the Darlington Range at Pimpama and Ormeau to the south, through to Shaws Pocket and Bahrs Scrub to the north. In the Beaudesert district it has been recorded from Veresdale Scrub on basalt soils again. On the Sunshine Coast where it was first discovered at Mt Eerwah near Eumundi/Cooroy, it occurs on basalt again.

A recent disjunct mature specimen was found on a basalt hill, "The Hummock" north-east of Bundaberg by M. Johnson in October 2018. It is in the Queensland Herbarium (RI AQ1000019). This is a marked extension of its distribution to the north.

There are two specimens, both collected by L.H. Bird, which are shown in Australia's Virtual Herbarium as just south of Townsville. One in the Australian National Herbarium (CANB 478488.1) is recorded from "just SE of Mt Elliott" and the other in the Northern Territory Herbarium (Darwin) (DNA D0056157) is recorded as "SE of Mt Elliott". These are both far out of the normal distribution of *P. eerwah* and it seems likely that the correct location is Mt Elliott, south of Ipswich (S 27.8200 E 152.8254) where there are records of *P. eerwah* from vine thickets. Most of Lloyd Bird's collections were from south-east Queensland. Another of Lloyd Bird's collections in the Australian National Herbarium (ANB 541266.1) is shown in Australia's Virtual Herbarium as east of Caboolture. Its locality is stated as "end of upper Ormeau Road S

of Beenleigh" and the coordinates used to place it near Caboolture seem incorrect. There are also specimens in the National Herbarium of Victoria from the Royal Botanic Gardens of Victoria.

Cultivation

Seeds germinate readily within a month usually, with distinctive large round cotyledon leaves. Growth from seedling stage is often slow and plants can suffer from scale and sooty mould if growth is not vigorous. Cuttings can be struck and this enables flower and fruit production to occur within two or three years. Otherwise, a seed-grown plant can take ten years or more to flower but flowering/fruitletting can occur much earlier in some cases where growth has been consistently vigorous. Planted specimens respond well to fertiliser application, regular watering and mulching.

Conservation

The species is being grown more frequently in recent years and there are some cultivated trees in suburban yards and in council parks, grown mostly from seed collected by some keen growers of native plants.

LandCare groups and at least one community nursery are also growing the plants under permit, for revegetation projects such as at Belivah Creek near Bahrs Scrub. There are two reserves with populations of *P. eerwah* at Ormeau, and a recent Logan City Council acquisition at Bahrs Hill near Beenleigh, plus another at Mt French, as well as Flinders Peak and Mt Eerwah Conservation Park, but most of the populations are on private properties where their future is not guaranteed.

The greatest threat to the species is clearing of the habitat. This is still occurring in some districts especially where the demand for residential land is increasing rapidly. There is also some pressure on small populations in the Ormeau district where some of the higher land on the spur of the Darlington Range is being mined for blue metal gravel for road base. Mining companies are aware of the plant's threatened status and some are working with LandCare and other community groups to ensure its survival there.

Threats include overrunning of habitat by weeds such as lantana (*Lantana camara*), creeping lantana (*Lantana montevidensis*), glycine (*Neonotonia whitii*), corky passionflower (*Passiflora suberosa*), and umbrella tree (*Schefflera actinophylla*). Feral pigs eat the fruit and seeds.

Acknowledgements

We are grateful to the late John Maclean who made a donation to the QNC which has been used towards the costs of printing this issue.

References

AUSTRALASIAN VIRTUAL HERBARIUM

https://avh.ala.org.au/occurrences/search?taxa=Planchonella+eerwah#tab_chartsView

[accessed September 2020].

BAILEY, F.M. (1894), An Account of the Easter Excursion of Members of the Field Naturalists' Section to Eumundi. Proceedings of the Royal Society of Queensland 10: 51-3.

BAEHNI, C. (1942), Memoires sur les Sapotacees. II le Genre *Pouteria*. Candollea 9: 147-476.

CENSUS OF THE QUEENSLAND FLORA. 2019. <https://www.data.qld.gov.au/dataset/census-of-the-queensland-flora-2019> [accessed September 2020]

DOMIN, K. (1928), Beitrage zur Flora und Pflanzengeographie Australiens. Bibliotheca Botanica 22(89): 1063

PENNINGTON, T.D. 1991. The genera of Sapotaceae. Royal Botanical Gardens, Kew, London.

ROYES, P. van (1957), Revision of the Sapotaceae of the Malaysian area in a wider sense. VII. *Planchonella* Pierre. Blumea 8(2): 235-444.

THOMAS, M.B. & McDONALD, W.J.F. (1989), Rare and threatened plants of Queensland: a checklist of geographically restricted, poorly collected and/or threatened vascular plant species Edn. 2: 1-76.

TRIONO, T., BROWN, A.H.D., WEST, J.G. and CRISP, M.D. (2007). A phylogeny of *Pouteria* (Sapotaceae) from Malesia and Australasia. Australian Systematic Botany 20: 107-118.

For all the decades I've been bushwalking, I can't remember ever having muddy boots so often as in the past 5 months (December 2020 to April 2021). After each walk my boots seem to have doubled in weight with all the caked-on mud they've accumulated during the day. At day's end, depending on the amount and state of the mud, I either hose and scrub the really wet stuff off, or scratch off the dried mud and then scrub with a scrubbing brush. But is this good enough?

With soil pathogens such as the phytophthora fungus occurring more frequently throughout Australia in recent years and causing dieback in some areas such as WA, and state and federal governments at the moment encouraging us to spend locally on stay-at-home holiday tourist options, it's important that we don't contribute to the problem of spreading these microscopic wrecking balls. Practising good hygiene with regards to our management and care of our boots is therefore a "no-brainer".

In recent years, we've seen increased installations of shoe sterilisation stations at entrances to national parks and state forests, complete with scrubbing bristles and pump-action sprays. (They were installed as far back as 2013 across the Gondwana World Heritage Area estate in Queensland.) But I think we need to do more personally.

Obviously, we should try to avoid any muddy areas during our bushwalks as phytophthora thrives in these conditions, and staying on tracks provided is also good sense. Taking heed of any signage or website information alerting us to the presence of dieback or phytophthora is also a sensible idea. But can we do something about our footwear to ensure we're not carrying pathogens even after scrubbing and drying?

I jumped on-line to see if there are any suggestions out there and came across a great website of the Perth Bushwalkers Club. They recommend after cleaning your boots, that you give them a good spray using a spray bottle with a mix of 70% methylated spirits and 30% tap water. Follow this up with a good day of sun-drying and your boots will be in a much cleaner state. This is what I've been doing after each bushwalk and I'm feeling a bit more satisfied that I'm not transferring any unwanted pathogens from place to place.



Another excellent but more expensive (\$130) option is what QPWS officers use. It's a veterinary grade disinfectant called F10, that is diluted at the rate of 1 ml per litre of water.

For the past 12 months or more, we've been getting used to the idea of wearing masks to stop the spread of the covid virus, but I think we also need to consider what we do with the other end of our bodies – our feet, and the footwear that covers and protects them. As Nancy Sinatra sang back in the 60s, "these boots were made for walking", but let's make sure that our walking leaves behind only footprints and not dangerous pathogens that'll destroy what we came to enjoy.

Sheryl: This article is particularly relevant in relation to the damage caused to our Bunya by Phytophthora in the following article.

Ancient Bunya trees in Queensland are dying from an invasive soil-borne disease
by Jo Khan



Bunya pines can grow to around 50 metres tall and live for a thousand years.
Photo Stuart Johnson / Queensland Parks and Wildlife Service

The towering ancient bunya pine is known for its enormous cones and edible nuts, which make it central to a rich Indigenous heritage of meeting, feasting and trade.

- Bunya pine trees have been dying in Queensland
- A soil-borne water mould called phytophthora is believed to be causing the dieback
- The bunyas are significant for the Indigenous people across Queensland

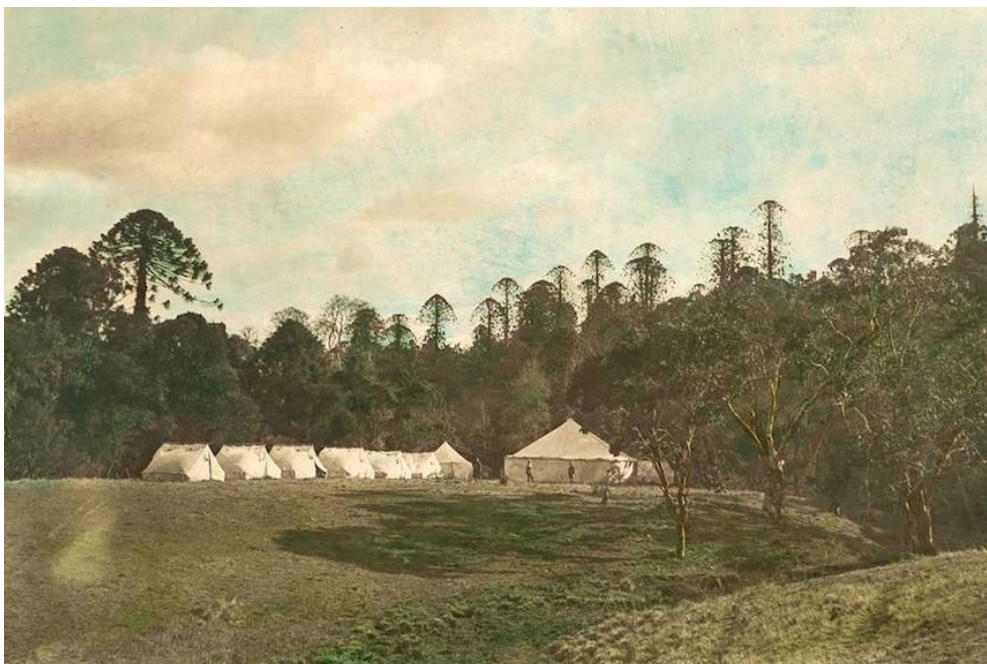
But in the pine's home in southern Queensland's Bunya Mountains, an unprecedented dieback of the ancient trees has scientists and rangers worried. It's believed an exotic soil-borne fungal-like organism called phytophthora has caused the death of around 50 bunyas, and there are concerns that the spread could continue. Some of the dead trees are thought to be between 600 and 800 years old, and would normally live for more than 1000 years according to Louise Shuey, a plant pathologist with the Queensland Department of Agriculture and Fisheries. Fifteen sites across the Bunya Mountains National Park appear to be affected by phytophthora, with infections confirmed at two of those sites, Dr Shuey said. "It's killing quite a few trees. That's pretty devastating."



Because the symptoms of disease are hard to see from the ground, it's possible the bunyas were first infected several years ago. Photo Greg Carter

'Tribal groups would travel for thousands of kilometres. The Bunya Mountains were a significant place for Aboriginal people from all across Queensland, said Damon Miri Anderson, a

Wakka Wakka man and Bunya Ranger. "Tribal groups would travel for thousands of kilometres to come for gatherings, do tribal marriages, dispute differences, and trade," Mr Anderson said. "A lot of the groups would camp in the foothills, and then travel up the mountain for ceremonies and corroborees, and to trade things. "The coastal mob would bring fish and shells that other people couldn't find out west."



The gatherings in the Bunya Mountains were thought to be the largest meeting of Aboriginal people in Australia. Photo: State Library of Queensland



The Bunya Rangers formed in 2009 after some Elders were concerned about a lack of Aboriginal management in an important cultural place, said Paul Dawson, general manager of the Bunya People's Aboriginal Corporation. "It was noticed there was some bunya dieback over the last decade without anyone being alerted," Mr Dawson said.

"The dieback increased two or three years ago quite noticeably. "It's a really important place so there is a lot of concern about the health of the bunya."

Queensland Parks and Wildlife rangers and scientists from the Queensland Department of Agriculture and Fisheries are now investigating.

What is phytophthora or 'dieback'?

Phytophthora is a type of water mould, which behaves just like a fungus, but is in a completely different group of organisms called oomycetes. It lives and is transported in soil, and attacks the roots of trees, eventually preventing the tree from getting any food or water. The initial symptoms of infection are dieback of the tree crown — the top part of the tree — followed by death over a few months, said Dr Shuey. "From the ground you can see that the leaves are starting to go brown and thin... but by the time you can see that, the disease is quite advanced," she said. "We want to try and get some aerial mapping done so that we can find out where the disease is starting."



Dr Shuey collected soil samples from around the bunya roots to test for phytophthora. Photo Louise Shuey

The species of phytophthora thought to be responsible for the bunya dieback is *Phytophthora multivora*, which has also caused dieback in the Wollemi pines in New South Wales, and the ancient kauri trees in New Zealand. Hoop pines, another native tree, might also be affected by phytophthora dieback in the area, but rangers have not been able to access the sites to confirm reported observations. The other main species of phytophthora present in Australia (it is an invasive species) is *Phytophthora cinnamomi*, and is responsible for extensive dieback in SW Western Australia.

Drought, pigs and dirty shoes. The emergence of the plant disease is closely linked to environmental conditions, and Dr Shuey thinks the drought has contributed to the bunya dieback. "There generally needs to be a period of wet which spreads the spores, and then a period of drought which we're going through right now," she said. "This means that the infected trees [that] may normally be able to tolerate the infection might be under more strain now. And that's when you start to see the decline." The Bunya Rangers are concerned about the time lag between identifying the disease and taking action to prevent its spread. It's suspected that feral pigs may be contributing to both the spread of disease and the declining health of the bunyas. "It's been shown in New Zealand and in WA that pigs can actually spread phytophthora, and they also eat the bark and nuts," Dr Shuey said. "But it may have also been brought in by hikers," she said, "You should clean your shoes before you come into any national park, because we think that's how it got spread in New Zealand and maybe in New South Wales." One management action is likely to be making sure soil particles aren't transported between areas on boots, equipment, or vehicles.



One of the first signs of phytophthora infection is leaf-browning.
Photo: Louise Shuey

Aerial surveys have revealed 15 locations in the Bunya Mountains may be affected.
Photo Greg Carter

While there are still a couple of thousand bunyas in the Bunya Mountains, Dr Shuey is concerned the situation could get worse given the small native range of the tree.



"I guess we're worried because we've seen in the kauri forest in New Zealand how quickly this disease can start to spread," she said. Phytophthora dieback has been detected throughout the kauri's native range in the upper North Island of New Zealand, where hundreds of trees have been wiped out. Scientists will trial the use of phosphite a fungicide in plantation bunyas, with the aim of being able to control the spread of the disease in the wild trees.

The method, which stimulates the immune system of the plant, has been used on New Zealand's kauris, with some success. Monitoring and testing of new areas is planned, and both the Queensland Parks and Wildlife Service and the Department of Agriculture and Fisheries have been meeting with the Bunya People's Aboriginal Corporation about management plans.



Scarring of a bunya tree believed to be made by Indigenous people to aid climbing to harvest bunya cones and nuts.

Photo: Louise Shuey

While so far only a relatively small proportion of bunya have died, each individual tree is significant to the Indigenous people of the region, said Mr Anderson. "Individual trees are really sacred, and during the gatherings every family group

would be given a specific bunya tree that they could climb and harvest off," he said. "People talk about the rainbow serpent and different things from their country, well we are the people of the bunya — that's what we tell our stories about. So when just one bunya tree dies, the loss of its important history is also felt, but preserved in the stories the Bunya People tell. "We're educating the young generation on the risk of losing the bnyas, that we have to preserve our bnyas," Mr Anderson said. "If it gets to the point where we don't have bnyas, we have to keep that songline and that story alive." The bunya dieback highlights the importance of Indigenous peoples' connection to country, Mr Dawson said. "Phytophthora is another indicator that the health of our country is in trouble, and we need to invest in Aboriginal people being on country and looking after it."

Ref: <https://www.abc.net.au/news/science/2019-12-10/anciet-bunya-pines-dying-from-plant-disease/11766594>

Bunya

by John Wrench

Most nuts are not nuts, especially Bunya seeds. In common, erroneous use, any hard, food seed larger than a cereal grain is likely to be called a "nut", whether in a hard shell or not. In fact, a nut is strictly a particular kind of whole, hard, dry, complete fruit, containing mostly one seed.

Reference – The Language of Botany, author C. Debenham. Published SGAP.

Page 144 "Nut - in a strict sense, an indehiscent, 1- locular, 1 or 2 seeded fruit with the three layers of the pericarp hard-textured and not distinct from one another but usually free from the seed."

Ref: Textbook of Botany, author J.M. Lowson MA BSc FLS. University Tutorial Press London 1946. Chapter 12 Fruits and Seeds Page 273 Achenial Fruits "defined as dry, indehiscent, one - seeded fruits". Types a,b,c,d,e are described. Type (e) Nut. "pericarp hard, woody (shell). The term (nut) is applied to all large, hard-coated achenes."

The Bunya, *Araucaria bidwillii*, is not a modern flowering plant (Angiosperm) but a more primitive plant, a (Gymnosperm) which develops large pine cones with many seeds enclosed in pericarps. Nowhere in any botanical text are the bunya cones or the seeds referred to as nuts.

Nowhere in the botanical descriptions of fruits and nuts are the gymnosperm seeds referred to as nuts.

In non-scientific literature the word nut is frequently misapplied to various seeds, alone or enclosed, probably in ignorance of the limited application of that term.

Warning! In human pathology, several types of dangerous allergies are caused by components of “so-called” nut foods. The misapplication of the word “nut” to a safe food, such as bunya, may lead to apprehension in persons connected with known allergies, extending to the readiness to inject adrenergic emergency medication. In an actual class situation where bushfood was demonstrated, a teacher used the term “bunya nut” despite a prior warning, with the result that several children protested and drew “Epi pens” when a sample was offered for tasting.

The insistence on the correct use of taxonomic language is sometimes criticised as being pedantic, but is in fact, never unwarranted. The misuse of synonyms, however, is never warranted, sometimes potentially harmful, but always misleading. The use of unofficial vernacular names on the labels of value-added bushfood products is regrettable, as it only serves to reinforce the ignorance of the lay public of the scientific basis of our practice.

<https://www.betterhealth.vic.gov.au/health/ConditionsAndTreatments/nut-allergies>

Bushfood PDF's

If you like something from these links, then save it to your hard drive as links have a habit of disappearing!!

<https://www.tourhero.com/en/magazine/gastronomy/guide-to-australian-bush-tucker-10-ingredients-used-in-traditional-aboriginal-food/>

<https://www.sbs.com.au/nitv/article/2017/05/25/10-bush-medicines-have-been-curing-people-generations>

<https://www.sydney.edu.au/news-opinion/news/2016/04/27/how-traditional-aboriginal-medicine-can-help-close-the-health-gap.html>

<https://theconversation.com/food-tools-and-medicine-5-native-plants-that-illuminate-deep-aboriginal-knowledge-145240>

<https://www.australiangeographic.com.au/topics/history-culture/2012/05/bush-medicine-aboriginal-remedies-for-common-ills/>

<https://www.organicgardener.com.au/articles/discovering-native-herbs>

<https://thespicepeople.com.au/2019/12/04/going-native/>

<https://anthropologyfromtheshed.com/project/roots-of-contention-noongar-root-foods-and-indigenous-plant-taxonomy/>

<https://www.jstor.org/stable/40386580>

<http://www.environment.gov.au/search/site/bushfood> Huge resource of publications.

Besides the Macadamia and Bunya, there are a surprising number of Australian native bushfood plants that have edible nuts or kernels. Among them are a few species within the *Elaeocarpaceae* family, such as the Buff Quandongs, *Peripentadenia mearsii* and *phelpsii* which have excellent tasting seeds. There is also the Johnstone River Almond, *Elaeocarpus bancroftii*, which has a sweet kernel, tasting a bit like coconut and almond but has a very hard shell, making it difficult to get at, but well worth the effort. The Candle Nut, *Aleurites moluccana* var. *moluccana* is a favourite of Les Hiddens, 'The Bushtucker Man', though they do require roasting first to alleviate its, shall we say, slight purgative effects. Even the Desert Quandong, *Santalum acuminatum* has an edible kernel as well as tasty flesh. There are also several species within the Family Proteaceae that have edible nuts, the most familiar being the Macadamias, The Bauple or smooth-shelled Bush Nut, *Macadamia integrifolia*, from north of Brisbane and the Rough-shelled Bush Nut, *Macadamia tetraphylla*, from south of Brisbane to northern NSW, or their hybrids. There is also, the Red Boppel Nut, *Hicksbeachia pinnatifolia* from southeast Queensland which has a good flavour and its northern cousin, *Hicksbeachia pilosa* which is a little less tasty and would be best roasted before consumption. The Macadamia is, so far the only Australian native nut to be grown in commercial quantities but as can be seen, there are quite a few others that have potential. One that is easily identified and has a flavour second only to the Macadamia and is also a member of the Proteaceae is the Atherton Almond or *Athertonia diversifolia*. Also known as the Atherton Oak, the plant was first described by Queensland Government botanist, C. T. White in 1918. He gave it the specific name derived from the Latin *diversi* meaning different and *folium* or leaves, due to the fact that different shaped leaves may be present on the one plant. It was placed in the genus *Hicksbeachia* in 1955 by botanist Hermann Sleumer and much later given its own genus *Athertonia* after the region where it naturally occurs, in the rainforests of the Atherton Tablelands. The Atherton Almond is a small to medium sized bushy tree with a spreading habit. In the rainforest, it can reach 30m but when grown in the open, would probably not exceed more than 10 to 12m in height. Young foliage is quite striking, juvenile leaves are large and deeply lobed with serrated margins and covered in fine rust coloured hairs. The intermediate, juvenile leaves can reach a length of 60cm while the leaves of the mature growth are much smaller, to 20cm in length and entire. All leaves are glossy green on the upper surface and paler beneath. Flowering occurs from March to June, the flowers are a creamy-brown colour and are borne on long racemes between 15 to 34cm in length. The large lens shaped fruit are 4-5cm wide and 2-2.5cm thick and hang in clusters, turning bright blue when they ripen in late spring to early summer. The blue outer skin contains a textured, woody shelled nut or endocarp, with a crunchy sweet kernel which has a skin or testa similar to that of an almond that can be removed by blanching if desired.

The Atherton Oak is a very attractive tree, though a little bit big for the smaller garden, it deserves to be more widely cultivated. Plants prefer a protected, frost-free situation in an organically rich, well-drained soil. Like all rainforest trees, they like a good thick mulch and respond well to applications of fertiliser.

A word of caution, while many Australian native plants have edible seed in varying degrees of palatability, there are some that are dangerously toxic, as are a few members of the Macadamia genus. It is very important to have correctly identified the plant and obtained knowledge regarding its 'edibility' before tasting.



Ref: This bushfood article first appeared in Sub-Tropical Gardening Magazine - January 2013

An extremely attractive tree with lovely, glossy foliage, long racemes of cream or brownish flowers and blue fruit with a hard stone that contains a sweet crisp kernel.

Tree grows to 25m, and is found in wet forests of the south east Tablelands, Mt Lewis and lowland Daintree. Fruits ripen from Nov to Feb. Fruits have a blue skin with a dryish white flesh surrounding a hard shell. Inside is an edible kernel that can be eaten raw or roasted. The nuts also make a tasty addition to cakes, biscuits and desserts.

Also eaten by Musky Rat-Kangaroos and Native Rats.

Ref: Bush Tucker of the Wet Tropics

Ma:Mu Bush Tucker Garden at Warrima Lakes, Innisfail



Photo – Doug Brownlow

Aboriginal people removed their bitter outer covering (testa) before eating (AK Irvine, Atherton, pers. comm.1998). Ref: Toxicity of Bushfood by Hegarty

These trees don't like the heat and require shade when it gets hot. It is suitable for medium to high rainfall areas such as Malanda on the Tablelands or Innisfail on the coast.

Kris Kupsch, Leader of the Rainforest Study Group: "they taste like c**p if eaten raw but when roasted and lightly salted they are delicious". Alan Batley said that he had success with *Athertonia* in achieving a rooted cutting and also from *Nothofagus moorei* with 3 successfully striking. Both species took about 5 months to strike - planted into straight sharp sand under a plastic bag cover. The optimum time for *Nothofagus* to be taken seems to be mid-summer. (Rainforest Study Group)

David Bender in Nth Qld has several old trees with 37cm diameter trunks but none have flowered or fruited. They do well in Malanda.

This plant is closely related to the macadamia nut. The white nut is encased in a very hard shell which must be cracked. This plant is not very easy to grow successfully but it is next to impossible to harvest good quantities of nuts from the wild on a reliable basis and so this plant is probably an economical proposition in the right location (eg Topaz).

The juvenile *Athertonia* is bright green, and has glossy and deeply lobed - they dry black, and would make a novel feature in dried flower arrangements or Ikebana.

Greg Calvert - A few years ago I assisted in an experiment to see how well rats could find the seed of the *Athertonia diversifolia*. Every seed we buried was dug up overnight by the rats regardless of how well we buried them. Some must escape to produce the next generation, yet out of several hundred we tried to hide, not one escaped.

The seeds of this species are occasionally eaten by people in north east Queensland. It is very difficult to find whole seeds on or under the trees growing in rainforest as the rats seem to get every seed while still attached to the tree and only drop the empty shells to the ground. Caution should be exercised and any seeds with the flavour or odour of bitter almonds should be completely avoided.

Healthy sugar origin in stingless bee honey revealed

The mystery of what creates the rare, healthy sugar found in stingless bee honey, has been solved by researchers at The University of Queensland, in collaboration with Queensland Health Forensic and Scientific Services.

The team found that the sugar trehalulose – which is not found in other honey or as a major component in other food – is produced in the gut of the bees.



Tetragonula honey pots. Image: Tobias Smith UQ

UQ organic chemist and research leader, Dr Natasha Hungerford said the origin of this rare sugar had been a puzzle since the discovery of [high levels of sugar trehalulose](#) in stingless bee honey. “We did not know if the trehalulose was coming from an external source – perhaps from native flora,” Dr Hungerford said. “It could have been something in the resin from trees that stingless bees collect and take home to their nest - because unlike European honey bees, which store their honey in honeycomb made only from beeswax, stingless bees store their honey in small pots made from a mix of beeswax and tree resins.”

Stingless bees are found throughout tropical and subtropical parts of the world. The larger, European honey bees (*Apis mellifera*) produce significantly more honey, and are the world’s major honey production species. However, stingless bee honey which is highly prized as a specialty food, is noted in Indigenous cultures for its medicinal properties and attracts a high price. “Trehalulose is more slowly digested and there is not the sudden spike in blood glucose that you get from other sugars,” Dr Hungerford said. She said the UQ team was keen to determine if the trehalulose content in stingless bee honey could be increased, potentially making stingless bee honey more valuable. “We fed confined colonies of the Australian stingless bee *Tetragonula carbonaria* the most common sugars found in flower nectar - sucrose, glucose and fructose. “What we found is that stingless bees have a unique capacity to convert sucrose to trehalulose and produce honey rich in trehalulose in their gut.”



Native plants such as Grevillea and Banksia are believed to have nectar high in sucrose, and it is believed bees feeding from these plants will naturally produce honey rich in trehalulose. The team also found that stingless bees fed a solution containing table sugar could convert it into a ‘honey’ containing high levels of trehalulose. “But the ‘honey’ they produce from table sugar does not meet the requirements of real stingless bee honey which is made from nectar,” Dr Hungerford said. “The honey we produced in the lab is in fact fake honey, and we were able to distinguish it from natural honey by isotopic testing.

“This trehalulose-rich syrup that was produced might be considered a potential secondary product of stingless bees, but it is not honey. “It is also not good for the health of the hive to feed the bees only table sugar. “Honey contains a complex range of phytochemicals from nectar, making it vitally important for brood rearing and the expansion of the colony population.” The UQ team will now work to identify different horticultural crops that have nectar high in sucrose.



“We want to investigate the nectar sugars present in crops such as macadamia, lychee and avocado, and whether stingless bee pollination of these crops could result in a high level of trehalulose in their honey,” Dr Hungerford said.



The research was funded by AgriFutures Australia, Queensland Health, Department of Agriculture and Fisheries and the Australian Native Bee Association.

It is published in *Journal of Agricultural and Food Chemistry* ([DOI 10.1021/acs.jafc.1c02859](https://doi.org/10.1021/acs.jafc.1c02859)).

<https://www.uq.edu.au/news/article/2021/08/healthy-sugar-origin-stingless-bee-honey-revealed>

Mint bush - *Prostanthera sieberii*

by Brush Turkey Nursery, Maleny

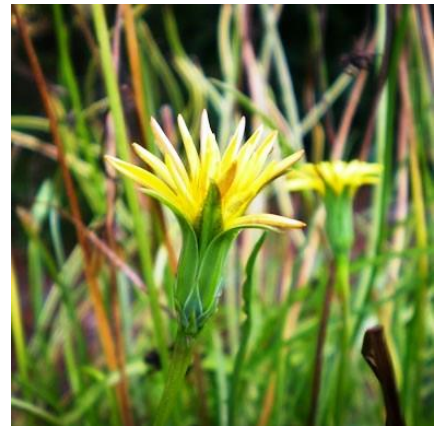
- Deliciously aromatic shrub to 1.5m tall.
- Dense and stunning when in masses of purple flowers.
- Edible leaves.
- Makes a great hedge.
- Suitable in containers
- Enjoys a regular prune to keep in good shape.
- Full sun to part shade.



Groundcovering yam daisy becoming popular as a bushfood. Produces bright yellow dandelion-type flowers and a pale edible tuber. Suitable for containers or well-drained garden beds. Full sun or part shade. Available now in 140mm pots.

Karen Shaw from Brush Turkey recently produced two videos with Sunshine Coast Council and their Living Smart Program. Here's the links to have a watch: Bushfoods in the Kitchen Part **Cooking ideas with Warrigal Greens, Lemon Myrtle and Native Mint.** <https://www.youtube.com/watch?v=-9R0jU4usg4> **Bushfoods in the Kitchen - Ooray / Davidson Plum** **What to do with a batch of Ooray Plums.**

<https://www.youtube.com/watch?v=biT-P1q>



Glenn Leiper recently received two plants from Brush Turkey Nursery which must have flowered recently and had formed seeds. The seeds were surprisingly quite large and he sowed them.

In only a fortnight, they'd germinated and now there are some seedlings that are growing rapidly. He potted the original plants up into larger tubs and in the potting-up process he noticed the large carrot-like tubers.

Glenn's photos below: 1. of the seeds, 2. of one of the potted up plants with two heads of foliage off the one large tuber, and 3. of the seedlings when they germinated. I look forward to seeing the flowers later on this year.

Karen and Spencer's Brush Turkey Nursery certainly has some interesting plants on offer and their quest for "new" reminds me of the pioneering attitude of Fairhills and Lakkari nurseries back in the 1980s. Great to see.



Sheryl: There's a link to an article below on the Ecology of Root Use by the Aborigines of Southern Australia by Beth Gott. Archaeology in Oceania. Published by: Wiley Vol. 17, No. 1, Plants and People (Apr., 1982), pp. 59-67 (9 pages)

<https://www.jstor.org/stable/40386580?refreqid=excelsior%3Ac9d24b3296f620cbaf5498a9d3346053>

Last year was the 10th anniversary of Myrtle Rust being brought into Australia. Note that I say “brought into” Australia, as the terminology usually used is “arrived” or “was first detected”. The latter could be taken as inferring that Myrtle Rust arrived in Australia all by itself. This is clearly not the case; Myrtle rust was brought into the country as result of the global trade and travel networks of human activity. We brought it here and we also need to be the ones responsible for preserving the amazing species diversity of Myrtaceae that has evolved in this land and is now threatened by Myrtle Rust.

So just how are we going to preserve the diversity of Myrtaceae in Australia? I can only speak of our personal experiences in observing the life cycles and propagation of many of our local rainforest Myrtaceae in SE QLD, but I think we are onto something. And that is, that preserving species that are threatened by Myrtle Rust, can best be tackled at a grass roots level (or at least at a tree and shrub level – pardon the pun), through the work of nurseries identifying and propagating from Myrtle Rust resistant plants.

Back in 2011, when Myrtle Rust arrived in SE QLD, you could have been forgiven for thinking that nurseries were the only source of Myrtle Rust and that going near a nursery was potentially dangerous to your own health! Sure, nurseries could potentially speed the spread of Myrtle Rust due to interstate plant transport, but once it was brought into and established in NSW it was only a matter of time before zillions of microscopic spores blew across the landscape and spread rapidly to colonise whole new areas. To try and stem the tide, Biosecurity then quarantined a few nurseries, – but the horse was well and truly bolted. Overnight the Myrtle name was tarnished, as the fear of Myrtle Rust spread. Some production nurseries disposed of all their Myrtaceae stock rather than trying to manage the disease, as the potential damage to their business from growing Myrtaceae outweighed the cost of throwing them all away. For those who persisted with growing Myrtaceae fungicide regimes became compulsory – although I’d argue that they mask the problem rather than treating it. What I’m trying to get to, in an albeit circuitous way, is that nurseries were perceived as the problem, when in fact I believe that nurseries and horticulturalists (native ones in particular) have the tools to help assist in preserving the Myrtaceae species that are under threat.

Luckily in Australia, Myrtle Rust has yet to have a significant impact on the dominant tree and shrubs of our woodlands e.g. Eucalypts, Corymbia, Angophora, Lophostemon, Melaleuca, Leptospermum (although locally on the Sunshine Coast we have observed some impacts on *Melaleuca quinquenervia*). However, many of our rainforest Myrtaceae have been significantly affected. These include species such as – *Gossia inophloia*, *Gossia hillii*, *Gossia punctata*, *Gossia acmenoides*, *Gossia bidwilli*, *Lenwebbia* sp blackall range, *Rhodamnia rubescens*, *Rhodamnia dumicola*, *Rhodamnia acuminata*, *Backhousia leptopetala*, *Backhousia citriodora*, *Rhodomyrtus psidioides*, *Decaspermum humile* and *Archirhodomyrtus beckleri*. These species have been affected to varying degrees, with populations and individuals within species showing variable degrees of susceptibility. Species such as *Rhodomyrtus psidioides* are bordering on functionally extinct, with the majority of individuals struggling to maintain foliage, let alone produce flowers or fruit. At the other end of the spectrum, other rainforest species such as *Syzygium oleosum* and *Acmena smithii* (which have only shown susceptibility over the last few years) only appear to be affected under irrigation in nurseries and not affected (at least as much) when planted.

Personally, given nearly 10 years of observations of Myrtle Rust and its impacts on our flora, I believe the only real hope for assisting in the preservation of Myrtaceae species that have demonstrated that they are vulnerable, is to assist those individuals and populations within a species that are demonstrating resistance and resilience. We (nurseries, horticulturalists, nature lovers in general) can assist these species by actively searching for, identifying and then

propagating and cultivating those individuals. This cultivation whether it be in gardens, farms or revegetation projects will then assist their resistant and resilient genes to spread through their populations. Resistance to Myrtle Rust does appear to varying degrees within the species listed above. For example, in *Acmena smithii* vulnerability appears to be the exception, but *Archirhodomyrtus beckleri* is about 50/50 in our area. Our cultivated *Rhodamnia dumicola* and *Rhodamnia argentea* can keep good leaf cover but are yet to produce viable fruit. *Rhodomyrtus psidioides*, which as mentioned before, appears to have very limited resistance across the majority of its population, and is really struggling.

Species that we have personally had success with so far include *Decaspermum humile* and *Lenwebbia* sp. blackall range, both of which we have selected and propagated from resistant individuals. We're also working on a few *Gossia* sp – so fingers crossed there too! Another observation we've made is that if plants that have been affected by Myrtle Rust and can be nurtured to produce flower, fruit and then seed, then the resulting seedlings appear to be more resistant than their known parent. We don't yet use systemic fungicides as part of our selection work, as discussed earlier it could just mask the problem. Selection of resistant individuals is the key to producing Myrtle Rust resistant / disease free stock. We did use systemic fungicides to comply with our Biosecurity requirements with regards movement of Myrtle Rust infected stock ... and thus far these are the only systemic pesticides we have used in our nursery. I'm not suggesting we don't use these systemic fungicides at all, but perhaps they would be best used for specific survival objectives rather than as a broad-spectrum management technique that could inevitably result in fungicide resistant strains of myrtle rust.

When it comes to surviving Myrtle Rust, the real action is taking place out in the bush as evolutionary processes select those individuals that are Myrtle Rust resistant to survive and reproduce. The best that we can do for now is get behind nurseries and horticulturalists who are passionate about our native flora. They are the front line in preserving our vulnerable Myrtaceae species. For 10 years we've seen major impacts to our rainforest ecosystems through the damage to Myrtaceae species and the loss of flowering and fruiting abundance they provided for our fauna, let's hope we can improve that situation somewhat over the next 10 years...

<http://www.brushturkey.com.au/decade-myrtle-rust-update-myrtle-rust-national-symposium-25032021/>

Paul Procriv: Great article, Spencer -- and great work! I'm relieved you're resisting the temptation to use systemic antifungals, as fungi will eventually develop resistance to them (and there's evidence that it can then jump across to fungi that cause deadly human and animal infections). A few years ago, I had about 1,000 seedlings of *Melaleuca dealbata* coming up, when they were hit by MRF, which knocked out almost all of them within a few weeks (just a golden sludge across the tray!) -- but a few did survive, which I potted up, and now seem to be growing into healthy trees, 1-2 m high so far. It's the only way (confirmed by history) to fight this in the long term: breeding up resistant strains. Keep up the good work!



ozbreed.com.au



invasives.org.au

This rare Myrtle shrub is relatively new in cultivation and has a lot of garden potential. Naturally growing 2-4m, has a nice bushy form, attractive glossy green foliage with a red flush and masses of white flowers.

The flowers are followed by a tasty black fruit good for you or the birds!



Decaspermum struckoilicum is an erect multi-stemmed shrub or small tree growing up to 5 m tall. The bark is smooth to somewhat flaky, grey or brown. The branchlets of the current year are round, grey to reddish brown, smooth, sparsely short sericeous, with indistinct oil glands. The leaves are discolorous, matte or slightly glossy above, matte below, decussate, opposite, usually evenly distributed along the branches and coriaceous. The upper and lower leaf surface is glabrous and the oils glands are prominent. The leaves are elliptic in shape, pinnately nerved, 18 to 55 mm long and 10 to 35 mm wide. The base of the leaf is cuneate, the apex acute, the uppermost tip is pointed to mucronate and the margins are flat. The leaf axils bear 2 to several setose, ferruginous hairs. The petioles are glabrous to sparsely sericeous, 1.5 to 4.5 mm long, glandular when young and becoming somewhat rugulose with age. The petioles are olive-green to reddish in colour and smooth to channelled above. The inflorescence is terminal or axillary, solitary or paired, paniculate, with anthopodia occasionally present. Peduncles are rigid, 2.5 to 4.5 mm long and subtend each flower. There are 2 bracteoles, linear to narrowly triangular, 1.0 to 1.4 mm long by 0.3 to 0.5 mm wide, ascending to erect. There are 4 or 5 yellowish white petals, which are glabrous to minutely ciliate, glabrous below, widely ovate to oblate in shape, 3.0 to 3.5 mm long by 2.5 to 3.5 mm wide. There are 16 to 25 stamens which occur in 1 to 3 whorls. The fruit is a soft glabrous, dark, bluish-black berry, subglobose to globose with a rounded base, up to 7.5 mm long and 8.5 mm wide. There are up to 8 seeds in mature fruits, which are rounded to somewhat reniform, flattened, dark, 2.2 to 3.7 mm long. *Decaspermum struckoilicum* is similar to *Decaspermum humile*, however it differs in the smaller, ovate, acute leaves and the shorter petioles (Snow and Guymer, 2001).

Ref: <https://apps.des.qld.gov.au/species-search/details/?id=27465>

Roasted Beetroot and Macadamia Spread

Place 1 cup of macadamias in a bowl and cover with water.

Allow to stand for 7-12 hours. Rinse and drain in a colander and set aside.

Preheat oven to 180C. Wrap 2 medium size beetroots individually in aluminium foil and bake for 30-40 minutes until a skewer inserted in the middle meets with no resistance. Allow to cool slightly before peeling. Set aside.

Heat 1 tbs oil in a heavy based frying pan over medium heat. Add 1 medium sized thinly sliced brown onion, reduce the heat and cook slowly, stirring occasionally for 7-10 minutes until it is soft and slightly caramelised.

Combine the macadamias, onion, 2 tbsps nutritional yeast flakes, ¼ cup water, 2 tbsps lemon juice (or to taste), 1 small garlic clove, ¼ tsp salt or to taste in the bowl of a food processor or a blender and process until smooth. Season to taste with extra salt if desired.

Portable chemistry kit sweetens native bush fruit production



Image: Selina Fyfe

Indigenous communities can now assess the quality and sweetness of their wild-harvested native bush fruits in the field, rather than sending samples off to food science laboratories. A prototype digital and portable bush fruits chemistry toolkit has been developed by University of Queensland researchers for communities to use on site, to measure key market attributes of popular bush fruits like Kakadu, Green and Burdekin plums.

[ARC Training Centre for Uniquely Australian Foods](#) Director at UQ, [Professor Yasmina Sultanbawa](#), said the kit would help support the knowledge already present in communities by providing scientific measurements to support their own observations.

“For instance, people in the community know which trees have the sweetest fruit – but now with help of the toolkit, they can measure the sugar levels of fruit on the tree to get an external measure of its sweetness. “Indigenous enterprises and interested buyers need to know product supply logistical measurements like the weight and size of the fruit (its pulp to seed ratio); how much sugar and salt content and acidity levels are in the fruit; and moisture levels.”

Professor Sultanbawa said this type of information was required to help understand the stability of the product, its suitability to be processed into a dehydrated powder, and to determine the type of packaging required.



Freshly picked bush fruit

“The toolkit has been designed to address these questions and will be tailored according to the needs of each Indigenous enterprise, depending on their current activities along the value chain.

“By ensuring consistently high-quality products, these enterprises are likely to get repeat, increased and new business, resulting in greater economic and social benefits delivered back into communities.

“Plus, the tool kit can be used to provide information on seasonality, growing conditions and plant physiology for Indigenous enterprises to own and share with future generations.”



Native bushfoods and seeds. Image: M. Puls

The toolkit, developed by UQ’s [Dr Anh Phan](#), was also supported by funding from the [Cooperative Research Centre for Developing Northern Australia](#) as part of the Australian Government’s CRC program, and can be used with any native bush fruit.



Professor Yasmina Sultanbawa
Djungan Paul Neal, Community Enterprise Developer at the Yarrabah Aboriginal Shire Council, whose community will house one of two chemistry test kits, said the kit empowered communities.



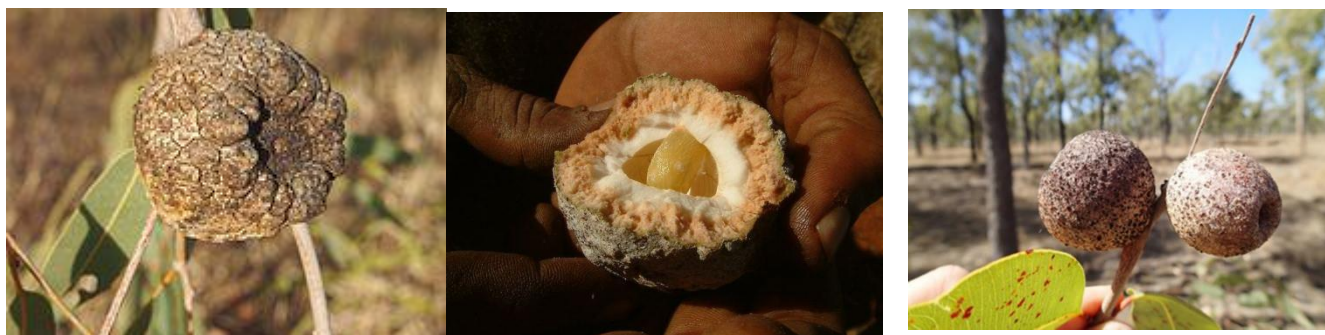
Djungan Paul Neal holds Burdekin Plum, Image: M. Puls

“We are interested in developing a commercially viable native foods industry, in partnership with industry and research organisations, that utilises traditional knowledge and science, and is led by Aboriginal people with governing intellectual property principles in place,” Mr Neal said. All the intellectual property generated in these projects will be owned by Indigenous partners.

Professor Sultanbawa said the research team was investigating different sensing technologies communities could use on site to measure other key properties of their fruit, such as vitamin levels, traceability, and provenance.

Bush Coconuts

The bush coconut is a product of bloodwood eucalypt trees that grow in the deserts of Central Australia. Believe it or not, the bush coconut is a combination of both an animal and a plant. Weird? I'll explain. The bush coconut grows only on desert bloodwood eucalypt trees (*Corymbia terminalis*). They are formed as a result of a symbiotic relationship between the tree and an adult female scale insect. When the insect attaches itself to the tree, the tree activates a defense mechanism, growing a "gall" around it. Not that the insect minds at all, as it is perfectly content living and breeding in the tree this way. The galls look like small, knobbly, woody fruit, and are able to grow as large as tennis balls. The galls were harvested by the Aranda people of Central Australia and eaten for the nutritious flesh inside. Galls were split open with a rock to access the white flesh, said to taste like coconut. Of course, nothing goes to waste — the insect inside the gall would also be eaten for its high water content and sweet taste.



The Bush coconut, or bloodwood apple, is an Australian bush tucker food, often eaten by Indigenous people of Central Australia. The bush coconut is, in fact, a combination of plant and animal: an adult female scale insect, *Cystococcus pomiformis*, lives in a gall induced on a Bloodwood Eucalypt (*Corymbia terminalis*). The gall looks like a small, knobbly woody fruit, ranging in size from a golf ball to a tennis ball, with a milky white flesh inside upon which the insect and its male offspring feed. Bush coconut is called Merne arrkirlpangkwerle in the Arrernte language of Central Australia. The gall is picked and then cracked open with a rock. The Arrernte call the insect angure. Ref: https://en.wikipedia.org/wiki/Bush_coconut

Bush coconuts (or bloodwood apples) are galls induced by scale insects on bloodwood eucalypts in northern and eastern Australia. The galls can be the size of a cricket ball, and both the internal gall tissue and the female that causes the gall are considered bush tucker. The female scale insect starts to induce the gall when she is a tiny nymph (only 200 microns long) and will spend the rest of her life enclosed within her gall, growing up to 4 cm in length. After mating, she first produces male offspring that feed on the nutritious white tissue that lines the inside of the gall.



Photo: ispotnature.org *Corymbia opaca*

When the males reach maturity and pupate, the adult female gives birth to her tiny daughters. These climb onto the elongate abdomens of their winged adult brothers and are carried away to a new host plant.



Figure 2. A bush coconut opened to reveal the wrinkly adult female in the centre. The white tissue inside the gall inspired the common name “bush coconut” or “bloodwood apple”.



Figure 3. Winged males, carrying tiny sisters on their abdomens, escape from a hole cut in a gall by a researcher. If carrying sisters is costly to a male and decreases his chances of finding a mate, there must be some trade-off between carrying sisters or going it alone in order for the life-history to have evolved and to be maintained. Almost all relatives of bush coconuts have a

chromosomal system called paternal genome elimination (PGE), such that males pass on only their mothers' gene copies (the fathers' copies are destroyed before making sperm). PGE systems result in unequal contributions of the mother and father to the next generation, and are thought to result from intersexual conflict. If PGE is also present in bush coconuts, then the success of a father's genes is largely through his daughters, but the behavior of his sons in helping their sisters might enhance his reproductive success.

We aim to determine:

- whether carrying his sisters is costly to a male
- whether there is paternal genome elimination in bush coconuts
- the relatedness of brothers and sisters within a gall: if there has been selection for males to increase their father's reproductive fitness by helping sisters, those sisters should be closely related to the males

Our results should help unravel the evolutionary consequences of sexual conflict.

Ref: http://www.apscience.org.au/apsf_16_6/ A project undertaken at the School of Biological Sciences, The University of Queensland, and supervised by Dr Lyn Cook and Dr Alicia Toon.

Email from Geraldine McGuire – Rainforest Bounty, North Qld

Hi - What a journey we've been on...

We have spent the last 20 years developing advanced plant genetics and a regenerative agricultural system to reverse the impact that industrial farming has had on Far Northern Queensland. The Australian native fruit industry has incredible growth potential as demand currently outstrips supply. Rainforest Bounty is uniquely positioned within the industry by having a combination of suitable farmland, technical knowledge and an established customer base. Today we launched our Expression of Interest campaign on Birchal. This means you can register your interest to be one of the first investors in our business when we launch our live offer.

Why Equity Crowdfunding? For the very first time private Australian companies have access to Equity Crowdfunding, allowing anyone to easily invest in young, high growth companies like ours. Our Customers have been spreading the word of Rainforest Bounty for years; equity crowdfunding is an opportunity to involve, and reward, these supporters while raising the capital needed to accelerate our growth. Our vision for Rainforest Bounty is the sustainable and ethical commercialisation of Australian native rainforest fruits, foods and botanicals in partnership with First Nation rainforest peoples.

We've come this far. To take the next step, reaching our most ambitious goals, we need to secure this investment.

If becoming a shareholder in our business appeals to you, please express your interest now. You will become the first to know when our investment offer is open:

<https://www.birchal.com/company/RB>

Kind Regards

Dr. Geraldine McGuire

Founder and CEO of Rainforest Bounty

info@rainforestbounty.com.au

Always consider the general CSF risk warning and offer document before investing