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Welcome to the West

By Karen Arnold

Nuytsia floribunda – Mooja / Australian Christmas Tree https://www.ecu.edu.au/__data/assets/image/0006/732894/6.-Australian-Christmas-Tree-Birak.jpg

Western Australia is home to a unique biodiversity. It is an ancient landscape with generally nutrient-poor soils and harsh growing conditions. Our soils are particularly lacking in phosphorous and nitrogen, tending towards alkalinity across most of the state with one exception being the bottom south west corner. Climatic conditions are exactly what you might expect, with a tropical north and temperate south divided or joined by a broad arid zone across most of the interior. In the north typical "wet season" summer downpours are experienced, while the south relies on winter rain. Wildfires are an acknowledged hazard across the state, especially in the south.

Indigenous Plants for Health Association, Inc.

Indigenous Plants for Health (IPHA) is a not-for-profit incorporated association, formed with the objectives of raising awareness, sourcing grants and sponsorship for sustainable production of indigenous plant-based products.

We acknowledge that Aboriginal and Torres Straight Island Peoples are the Traditional Owners of this country, and they retain their relationship and connection to the land, sea, and community .

Difficult conditions promote diversity and these potential handicaps have been exploited by native and endemic flora to develop distinctive characteristics and growing strategies. This innovation has paid off, particularly in the south, gradually creating the South West Australia Ecoregion, one of the world's 34 major Biodiversity Hotspots.

Welcome to the West, take two

There is a variety of forms bush food or medicine can take, with one of the most obvious being the steeping of flowers or foliage to create alternatives to drinking plain water. The refreshment and conviviality of shared drinks inspired this introduction and welcome to the flora of WA.

Taking a step back from steeping drinks, nectar sucked from blossoms is possibly the simplest utilisation of native flora. Anyone who has spent time in the south west will already know a lot of our local plants can be extremely attractive, until you touch them. These are plants who have adapted to survive the extremes of summer heat, wild fires and drought. They can be low-lying and wind-pruned with typically hard, small leaves which are often surprisingly spiky. Birds may appreciate these attributes but the human fingers or noses do not fare so well.

Following is a list of southern WA plants known to have nectar-rich flowers historically used either to steep in water or sup directly. Included are their English and Aboriginal common names, plus main flowering seasons. When considering Indigenous 'seasons' there are different interpretations for different areas and for the south / south-east of this state, the Nyoongar 6 Season calendar has been used. Similarly, it must be understood there are several Aboriginal names for the same plants, depending on locality. In conclusion there is a little extra focus on Mooja, or *Nuytsia floribunda*, chosen for its strong presence in the south-eastern part of WA from where this is being written.

Nectar-rich Flowering Plants of South WA

Banksia spp. - generally notable for their nectar, several species have been listed although there are many more. Of the 173 Banksia species 60 are exclusively native to the south west of Australia. As well as producing a refreshingly sweet drink, Banksia flower infusion is considered to soothe sore throats and coughs (Hansen & Horsfall, p.16; WA Museum).

Banksia fraseri – **Budjan / Butyak** – yellow-green flowers during **Djeran** to **Djilba** (April-September) (WA Museum).

Banksia grandis - Bull Banksia – **Poolgarla** – tall, yellow-green flower spikes during the season of **Birak (**Dec-Jan). **Mangite / Mungitch** is the name for the beverage from this Banksia, described as a type of "honey-sweet mead" (Walley & Keighery, pp.40 & 41).

Banksia sessilis – Parrot Bush – **Pulgart / Pudjak** – cream/yellow dome-shaped flowers, throughout **Djeran – Kambarang** (April-November). One of several Banksia species previously recognised as Dryandra, with the common name of "honey pots" due to the cup shape of their flowers and the delicious nectar held within. This particular species, unfortunately, has *very spiky foliage* to navigate (Hansen & Horsfall, pp. 130 & 131).

Banksia sphaerocarpa – Round Fruit Banksia - **Nugoo** – there are several varieties of this Banksia all with yellow-orange, red-brown or purple-brown flowers from **Birak** to **Makuru** (January-July) or **Kambarang** to **Birak** (October-January) (WA Museum).

Corymbia calophylla

B. prionotes – Acorn Banksia – distinctive flowers in cream and orange during late **Bunuru** to early **Djilba** (late Summer to early Spring) (Hansen & Horsfall pp.14-15).

B. dallanneyi – Couch Honeypot – **Bullgalla** – almost the rainbow of colours; pink-brown-yellow-cream-green during late **Djeran** to early **Kambarang** (May–October) (WA Museum).

Corymbia calophylla – Marri / Red Gum – **Mahree / Ngumbit** – pink / white flowers produced during **Birak** to **Djeran** (December-May). The sweet drink made by soaking Marri flowers is called "**neip**" (Hansen & Horsfall, pp.208 & 209).

Eucalyptus wandoo – White Gum – **Wandoo / Dooto** – creamy-white flower clusters from **Birak to Djeran** (December-May)**.** Wandoo is just one of the various Eucalyptus species known for their enticing fragrance and nectar (Hansen & Horsfall, pp.208 & 209).

Eucalyptus wandoo

Kennedia prostrata – Running Postman – **Wollung** – eye-catching, red pea flowers any time from **Djeran** to **Kambarang** (April-November). Nectar from the flowers of this prostate ground cover is soothing to the throat, while the leaves can be used to make an uplifting tea (Hansen & Horsfall, pp.156 & 157).

Kennedia prostrata

Leptosema aphyllum – Ribbon Pea – a low growing, twining plant with beak-shaped flowers; bright red to yellow-green-red combinations from late **Djeran** to early **Kambarang** (May-October) (WA Museum).

Malva preissiana – Native Marshmallow – white-pink-mauve flowers eaten fresh; infusion of flowers sipped to relieve inflammation of git and respiratory tract – **Makuru** / late **Djilba** to early **Birak** (July / September-December). This plant is fairly wide-spread, occurring right across to the eastern states (Hansen & Horsfall, pp.18-19).

Nuytsia floribunda – WA Christmas Tree / Flame or Fire Tree – **Mooja** / **Mudjar** – brilliant yellow-orange flowers from around **Kambarang** to **Birak** (October-January). When soaked in water Mudjar flowers create a sweet drink. (See photo page 1, above.)

Nuytsia floribunda is endemic to the southern areas of WA, commencing around Kalbarri National Park above Geraldton on the west coast, to Israelite Bay in the eastern corner of the state, neighbouring the Nullarbor.

Noongar Aboriginal people consider this plant to have a graceful association with their ancestors, granting them the opportunity to rest among the shady branches before departing on their journey to the spirit world.

In the south east of WA, a local Nyungar dreamtime story tells of Mudjar Yok, a beneficent, golden-haired Aboriginal woman who promised to watch over her people even after death. When Mudjar Yok visits each year her name-sake trees fill with bright flowers. These flowers virtually glow tangerine in the summer heat, particularly following a bushfire when the display is even more extravagant.

Nuytsia floribunda is hemi parasitic, able to extend underground roots to within a radius of 55 metres in search of host material; while also capable of self-sustaining photosynthesis once a foliage canopy has been established. With the (often unrealised) potential to grow up to 12 metres in height, Nuytsia is notorious as the world's tallest parasitic plant, more like a tree, and really standing out among lower-growing, often scraggly companions.

Nuytsia's striking flowers are composed in groups of 3 and can appear as densely abundant sprays along the drooping branches. The central flowers are female and lateral flowers male. *Nuytsia* is not for the impatient gardener as it is very slow growing—seedlings perhaps reach 10cm in their first year—and you may be rewarded with an initial flowering after 6 years, but expect to wait on average around ten. Given *Nuytsia's* determined, foraging roots mentioned above, it is fair to say *Nuytsia* is not for the suburban garden either.

Nuytsia was a challenging puzzle for early botanists and remains appropriately the only species in its genus within the Loranthaceae family. Described as "irresistible to the botanically curious" (Hopper 2010), an entire article could easily be filled with *Nuytsia's* quirks. Staying relevant to the IPHA focus however, it can be mentioned *Nuytsia*'s nutritional use extends beyond flavouring water as the plant produces juicy, edible suckers with a sweetness to match the drink. This provides a reasonable excuse to revisit Mudjar within a separate category of bush foods, that of tubers and roots. Until then, the references below offer some interesting sites well worth taking the time to explore.

(Groom & Lamont 2015; Hopper 2021; Keighery 2014; Mudjar Aboriginal Corporation 2020; Walley & Keighery 1997; WA Museum)

Leptosema aphyllum

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An informal but excellent source concerning plants native to the eastern part of the south west is Esperance Wildflowers Blogspot– truly a love letter to our local species http://esperancewildflowers.blogspot.com/

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An educational resource produced by Bronwen Keighery (2014) from the Wildflower Society of Western Australia - intended for children but good fun and informative http://www.wildflowersocietywa.org.au/wp-content/uploads/2015/08/Mooja-Discovery-Pack.pdf

Some delightful, old paintings of Nuytsia floribunda

"Flowers of the Flame-Tree and yellow and black twiner, Western Australia" by Marianne North (1830-1890), Marianne North Online Gallery, Kew Gardens https://www.kew.org/mng/gallery/766.html

"Study of the Western Australian Flame-Tree or Fire-Tree" by Marianne North (1830-1890), Art UK https://artuk.org/discover/artworks/study-of-the-west-australian-flame-tree-or-fire-tree-88300

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Indigenous Plants for Health Association (Inc)

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Editorial

Welcome to the winter edition, typically this is a relatively quiet season as we start to prepare for the upcoming spring events, and the growing season ahead.

Our spring will be marked by another Field Day and AGM (Covid permitting) around the spring equinox, full details inside. For Queensland members an event will be planned for later in the spring, details will be forthcoming a little later.

As previously reported, we have been seeking out a new partnership with a research institution, in order to continue on with the geebung research and other indigenous health-promoting plant projects. Following a presentation that I gave to a group of postgrad research students at "Uniquely Australian Foods", a research training centre at Queensland University, planning collaborations are now underway with the Centre's Director Professor Yasmina Sultanbawa and their Engagement Coordinator Sophie Ader. Initially we plan to proceed with phytochemical analysis, antimicrobial and antioxidant testing of Persoonia (geebung) samples collected in the Hunter Valley.

Subsequent to our meetings, Sophie, an existing IPHA member, has agreed to take on the vacant position of Director of Research on our committee. This relationship will help to streamline our future collaborations with the University of Queensland and other potential partners.

This, the July edition of the IPHA newsletter features a review of native medicinal plants from one of our Western Australian members, Karen Arnold, highlighting a selection of fascinating plant species most of which are unfamiliar to those of us in the eastern states (see page 1). As always, I invite feedback and articles or reviews from our members, wherever you are in this great country.

Phytochemistry of the bush

Pt. 3. Saponins and triterpenoids

By Andrew Pengelly PhD

> Saponins are compounds whose active portions form colloidal solutions in water, which produce lather on shaking and precipitate cholesterol. They occur as glycosides whose aglycones are triterpenoid or steroidal structures. Their structures combine lipophilic (fat-soluble) terpenes at one end of the molecule and hydrophilic (water-soluble) sugars at the other. This property gives them the ability to lower surface tension, producing the characteristic detergent or soaplike effect on membranes and skin, rationalizing the traditional use of saponin-rich plants as fish poisons and for industrial applications of isolated saponins such as foaming agents, cosmetics and pharmaceutical products. From Pengelly, A. 2021. *The Constituents of Medicinal Plants* 3rd ed. CABI.UK.

Saponins are widely distributed in the Australian flora. Like all terpene-derived molecules, triterpenes are insoluble in water, but when they bond with one or more sugars, they readily dissolve in water. Saponin classification is based on the structure of the triterpenoid portion (the non-sugar or aglycone). The most widely distributed triterpenoid aglycone is oleanolic acid, from which the oleanane-type ring system derives. Some Australian plants such as *Planchonia careya* and *Dodonaea viscosa* contain saponins of this kind.

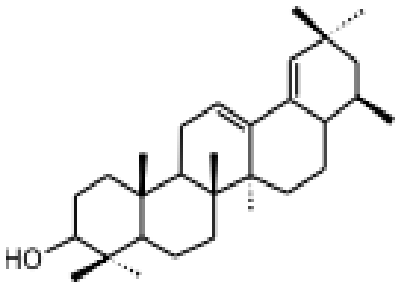
The first observations of Aboriginal use of saponin-containing plants were in the form of fish poisons, or piscicides. A variety of compounds are known to have piscicidal actions, however the saponin-containing plants are the most readily observable, since they are so water-soluble they cause the water to foam, being rapidly absorbed by fish and molluscs such as snails, where they paralyse respiratory function (Williams, 2012). The most famous saponin-containing piscicide is a South American Tree, *Quillaia saponaria*, known as soapbark. Australian too has its' soapbark trees (e.g., *Jagera pseudorhus*) which have also been used as piscicides; some of these are also valued for their medicinal properties.

Therapeutic actions of saponins

Saponin rich plants are widely used as soap substitutes and antiseptics in traditional medicine, an application that has been linked to wound healing, anti-inflammatory and antimicrobial activities in many species. Due to the local detergent effect of saponins, they are useful for treating wounds and skin infections. Saponins can reduce swelling and inflammation in small blood vessels and capillaries. One European example is the saponin-rich horse chestnut (*Aesculus hippocastanum*), which is widely used as a treatment for varicose veins and haemorrhoids.

Taken internally saponins act as expectorants, diuretics and antimicrobials. Given they are structurally related to steroids, and many saponin-containing plants have steroid-like anti-inflammatory properties. Steroidal saponins, a less common sub-category of saponins, are not commonly found in Australian flora, other than the glycoalkaloids that occur in the Solanum genus. These nitrogen-containing steroidal saponins are classified as alkaloids, they were reviewed in part 1 of this series.

Oleanane ring system



Some saponins have haemolytic properties, which causes the breakdown of red blood cells, leading to anemia. However when taken orally, saponins are quickly metabolized before they enter the bloodstream, so there is no risk of haemolysis. Taken intravenously they would have this effect, but nobody is recommending the injection of herbs! Saponins do irritate mucous membranes (hence their expectorant and diuretic properties), and in high doses they can irritate the stomach lining and cause vomiting. To underline their general level of safety, saponins are commonly found in everyday foods such as oats, spinach and asparagus.

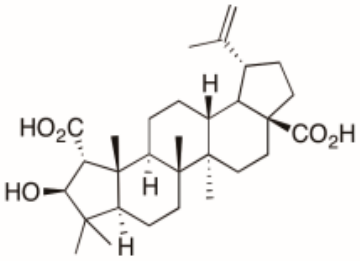
Native plants with saponins

Alphitonia excelsa

While there are five species of *Alphitonia* in Australia, *A. excelsa*—the red ash or soap tree is by far the most common, growing from coastal NSW right up through Qld to the top end of NT and WA, often extending quite a way inland. The most striking feature of the tree is the leaf, being glossy dark green on top, but whitish below with rusty brown midribs.

The red ash in flower, showing white under-surface of leaf.

Aborigines make good use of the foaming, detergent properties, by rubbing leaves between hands with a little water to produce a good lather, handy for cleaning and disinfecting the skin. Infusion of leaves in warm water is used as a lotion to relieve headaches and sore eyes. A leaf infusion may also be used to relieve bites and stings.



alphitonic acid

A. excelsa contains the triterpenoid compounds ceanothic, betulinic, alphitolic acids and alphitexolide. High levels of saponins were detected in the froth persistence test using aqueous extracts, while moderate levels were detected with a methanol extract (Cock, 2020).

A. excelsa aqueous leaf extract was shown to be a good inhibitor of bacterial pathogens associated with food poisoning and diarrhoea, while the methanolic extract inhibited the pathogen *Staphlycoccus marcenscens*, a bacterium associated with hospital acquired infections, such as associated with the use of catheters (Cock, 2012).

Alphitonia petriei

A. petriei is a rainforest colonizing species, found between northern NSW and the Torres Strait Islands. Leaves of the tree contain methyl salicylate, giving off a pleasant wintergreen-like aroma. The leaves also contain a similar range of saponins as for *A. excelsa*. Several triterpenoid compounds from *A. petriei* have demonstrated potent anti-inflammatory activity in vitro (Rau et al., 2016).

Jagera pseudorhus

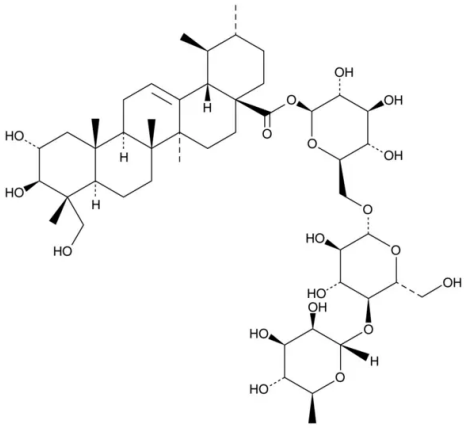
As mentioned above, bark from *Jagera pseudorhus*, the foambark tree is an Aboriginal fish poison. As with *Alphitonia excel*a leaves, the bark of this tree will form a good lather when added to water, and it can be used for similar purposes.

During World War I when Quillaia bark was unavailable, the native foambark was used to produce the foamy head in Australian beer – an essential function! (Williams, 2012).

Jagera pseudorhus
leaves and fruit, far right.
Right - flowers.

Centella asiatica

The herb gotu kola or Indian pennywort (*Centella asiatica*) is thought of more as an Indian and Ayuverdic herb, however the species is also widely distributed in eastern Australia, particularly in coastal areas.
Gotu kola contains mixtures of saponins and free triterpenoids of either ursane or oleanane structural types. Asiatoside (pictured) contains 3 sugar molecules attached to the ursane-type triterpene aglycone. In both traditional and modern herbal medicine, *C. asiatica* has been used for wound healing, eczema and psoriasis, burn and scar treatment, skin infections and for revitalizing connective tissue (James & Dubery, 2009). An asiatoside-enhanced *C. asiatica* extract was shown to be a potent wound healer in vitro and in vivo (Azis et al., 2017).



Asiatoside

gotu kola – image from Wikispecies

Dodonaea viscosa

Hop bush is one of the most phytochemically rich and medicinally potent plants from the Australian bush, with a long tradition of use in traditional medicine of Australia and other continents. Recent phytochemical screening revealed the significant amounts of saponin in *D. viscosa* leaves (Saranya & Divyabharathi, 2019). In fact numerous saponins have previously been identified from the species, many such as Jegosapogenol, jegosapogenol di-angelate and doviscogenin have oleanane structures (Ghisalberti 1998). Other saponins are dodonin, dodonosides A and B which were found to be barrigenol esters (Wagner et al., 1987).

The high content of saponins in *D. viscosa* goes some way to rationalising the broad range of medicinal uses, many of which have been validated in experimental research. These include wound healing, antimicrobial, anti-inflammatory, analgesic, spasmolytic, anti-ulcer and anti-diarrhoeal properties (Al-Snafi, 2017).

Left:
Dodonaea viscosa

Photos this page — Wikipedia

Right: Flower and fruit of the cocky apple

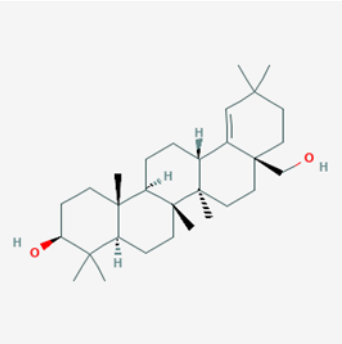
Planchonia careya

Planchonia or cocky apple is another typical saponin-containing species, the inner bark being widely used as a fish poison in Northern Australia, as well as for bathing and treating wounds. Typically the inner bark is gently boiled in a billycan of water, causing it to froth up, then used to bathe cuts and wounds, while the root bark is useful for bandaging the wound (Aboriginal Communities, 1988).

In one analytical study one oleanane and two ursane-type triterpenoids were identified (Ferriera et al., 2021). Lassak & McCarthy (1983) report the presence of two oleanane saponins, moradiol and erythrodial – the latter compound is also found in olive oil.

*Pittosporum angustifolium (*syn. *P. phylliroides)*

Commonly known as gumbi gumbi and weeping Pittosporum, *P. angustifolium* is a well-known Australian bush medicine. It is found throughout much of inland Australia, though not generally in great abundance. Traditional uses include for treatment of skin infections and eczema, muscular aches and pains, and as a cancer remedy. All parts of the plant have medicinal applications.



Moradiol, an oleanane triterpenoid

Phytochemical analysis if gumbi gumbi leaves revealed the presence of several pentacyclic (five carbon rings) triterpenoid saponins including phillyregenin, barrigenol, 27 - desoxyphillyrigenin, dihydropriverogenin A, 16 - desoxybarringtogenol C and barringtogenol C (Vesoul & Cock, 2011).

Weeping Pittosporum or gumbi gumbi

Aegiceras corniculatum

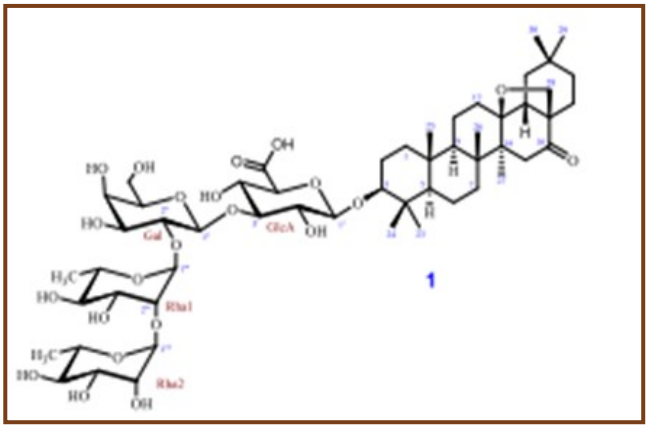
The river mangrove is the most common mangrove found away from the coastline in Eastern Australia; it is easy to find along the tidal zone of the Brisbane River and its tributaries. Distribution extends into SE Asia. Indigenous Australians have used the leaves (as decoction or juice) for relieving earache, though for females only according to one report (Lassak & McCarthy, 1983). Research from Vietnam indicates the presence of the saponins aegicoroside A and sakurasosaponin from the leaves, which were shown to be cytotoxic to cancer cells (Vinh et al., 2019). Saponins are also present in the bark and fruit.

Aegiceras corniculatum—River mangrove.

Native cherry. Photo credit Alan Moore
megoutlook.org/tag/native-cherry-exocarpos-cupressiformis

Exocarpus cupressiformis

The so-called native cherry is a hemi-parasite tree in the sandalwood family. It can be seen in the bush throughout SE Australia and into southern Queensland. The "cherry" is actually a red fleshy stalk to which the fruit is attached, but it is quite tasty. A tea made from the twigs has been used to make a bitter tonic. Oleanane-type saponins have been extracted from the twigs and tiny leaves of this species (Lassak & McCarthy, 1983).



Aegicorgoside A—from the river mangrove
Note presence of four sugar molecules

Barringtonia acutangula, B. racemosa, B. calyptrata, B. asiatica.

The Barringtonia genus of trees can be found in tropical regions around the world. They are in the Lecythidaceae family, which also includes *Planchonia careya* (reviewed above).

In Australia we have the four species listed—some of these extend into Asia and New Guinea. The Australian species are found in northern rain forests and along beaches, while *B. acutangula* prefers coastal and riverine mangrove zones. The saponin-rich bark of these trees are piscicides, leading to the common name of fish-poison trees. Despite this they are not favoured fish poisons, since they are so potent the water remains toxic for an extended period, thereby depleting fish stocks (Williams, 2012).

Barringtonia acutangula (flowering branch)
Photo: G.Sankowski © Zodiac Publications

Barringtonia spp. are used in traditional medicine, both in northern Australia and Asia, for a wide range of internal and external conditions. All species contain high levels of saponins in their bark, leaves and fruit; these include barringtogenols, barringtogenic acid, sakurasosaponins and acutagenic acid. Williams (2012) documents the research investigations into Australian species, for anti-microbial, anti-inflammatory, analgesic, antiparasitic, sedative and antidiabetic actions. Saponin-containing leaves and seeds from *B. acutangula* were found to have anti-nociceptive (pain relieving), central nervous depressant and antidiarrhoeal activity in vivo (Imam, Sultana & Atker, 2012).

Conclusion

As we saw in the previous article on tannins, saponins have unique physical as well as chemical properties, and the marked detergent effect so readily observed with saponins has led to their many industrial uses, from fish poisons to soap making and beer manufacture. Medicinal properties too can be attributed in part to these physical properties, particularly for topic applications and wound treatment. When taken internally, saponins are rapidly hydrolysed and the sugar component is released, and the detergent effect is lost. However, the remaining triterpenoid aglycone often turns out to be the most active component, and we are only just beginning to learn about their many therapeutic benefits.

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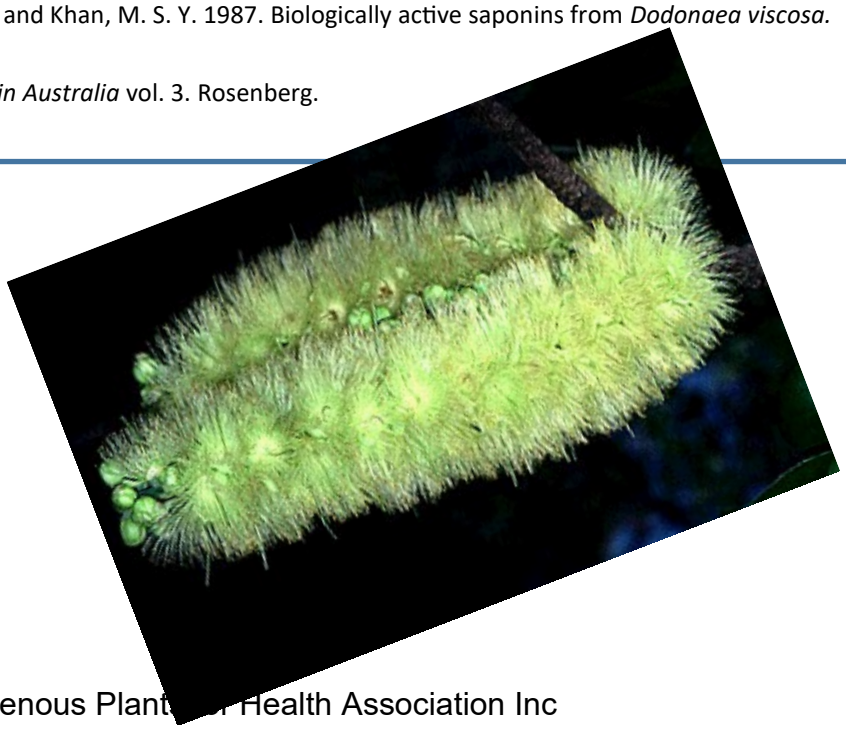


Barringtonia calyptrata (flowers)
Photo: G.Sankowski © Zodiac Publications

Welcome new committee member: Sophie Ader

Sophie is the Engagement Coordinator for the **Uniquely Australian Foods** Industrial Transformation Centre. Her role with the University of Queensland is focussed on supporting the development of strong, two-way learning relationships between the centre staff and students, and partner Indigenous Enterprises, communities and the broader industry. She helps to ensure that the design, conduct and translation of research is done collaboratively, to benefit Indigenous enterprises and communities and build future leaders in the native botanicals industry. She holds a Bachelor of Social Science (Psychology), a Post Graduate Diploma in Public Sector Management and a Master's of Training and Development.

Sophie and her husband (and their two young children, whether they like it or not!) are long term, keen gardeners/permaculturalists, and own a 9.8 acre property in Southeast Queensland, on which they grow a diverse range of native and exotic medicinal and edible plants. They are also part of their local Koala Conservation, and Water Ways Catchment Care programs, both of which involve a range of bush care activities such as weeding, measuring water biodiversity, regenerative planting to restore biodiversity and habitat, and fire management for weed suppression and growth stimulation.

Sophie's passion for Australian biodiversity & care is fuelled by her love and respect for, and continued work with, Australia's First Nations people. Sophie will fill the vacancy for the IPHA Director of Research position.

Photo credit:
Craig Nieminski
Darwin 2009

Advances for the Bushfoods Industry —
—and what we learned from the Ancients

By Andrew Pengelly

Uniquely Australian Foods is a research centre attached to the University of Queensland, under the directorship of Professor Yasmina Sultanbawa, a prolific researcher and publisher on the science of bush foods.

The Research Centre aims to transform the native Food and Agribusiness Sector through development of selected crops, foods and ingredients using an Indigenous governance group to oversee the process of converting Traditional Knowledge into Branded Products. The centre is supported by a number of native foods businesses (including an Indigenous Enterprise Group) who are closely linked to centre projects and outcome. uniquelyaustralianfoods.org

Whilst we may be forgiven for thinking the continuing growth of the bushfood industry has opened up opportunities and employment for Indigenous people, a 2019 survey found that Indigenous involvement in the supply chain for bushfoods is less than 1%! Some improvement from that small figure in the last few years indicates that number may be closer to 10% now.

"Demand for bush food is booming, so why are so few Indigenous people involved in the sector?"

Hopefully, a number of initiatives at work are turning that statistic around. For example:

IndigiGrow, a community non-profit organization in South Sydney is training young indigenous people to propagate and market bushfood plants.

> "Bush food, native plant products to be developed by Indigenous community and University of Queensland" ABC News, 19.2.21.

The following species from the Australian arid zone are known to have been used for flour production: Native millet (*Panicum*), spinifex (*Triodia*), wattle-seed, pigweed (*Portulaca oleracea*), prickly wattle (*Acacia victoriae*, *A. aneura, A. tetragonophylla*) and bush bean (*Rhyncharrhena linearis*). "Food Culture: Aboriginal Bread," Australian Museum blog.

While 30,000 years of seed grinding may be a little hard for us comprehend, recent archaeological research reveals humans occupied Arnhem Land in Northern Territory as long ago as 65,000 years. Many plant remains, along with seed grinding and other stone technology tools, were uncovered at Madjedbebe, Australia's oldest archaeological site, providing evidence that these early humans exploited a diverse range of food sources (Florin, Fairbairn, Nango et al., 2020).

Pandanus spiralis - nut above, tree right
Images from Wikipedia Commons.

Edible species identified consisted of fruit and nuts, palm stems, roots, tubers and seeds (see table for species list).

Some edible plant species remains found at Madjedbebe, Arnhem Land			
Common name	**Botanical name**	**Food source**	**Other uses**
Green plum	*Buchanania obovata*	Edible fruit, tasty	Twigs relieve toothache, eye lotion
White beech	*Canarium australianum*	Edible seeds	
Screw palm Anyakngarra	*Pandanus spiralis*	Edible kernals	Labour-intensive extraction with stone tools
Wild pear	*Persoonia falcata*	Edible fruit – raw or as paste	Leaf tea or chewing fresh leaves for coughs
Billy-goat plum	*Terminalia spp.* Species not determined	Many NT species have edible fruit	*T. fernandiana* is an extremely rich source of vitamin C and polyphenols
Sand palm	*Livistonia humilis* and other species	Apex, pith of stems	Rarely used remedy for sore throats prepared from stem tips

Details from Florin, Fairbairn, Nango et al., 2020. Medicinal use info from *Traditional bush medicines.* 1988. Aboriginal Communities of the Northern Territory of Australia. Greenhouse Publications.

Wollongbar TAFE, in northern New South Wales, is home to Australia's first bush food production course for Indigenous people. According to the peak industry body, Australian Native Foods and Botanicals, demand — particularly international — is currently outstripping supply.

Kangaroo Grass

In Victoria the Dja Dja Wurrung Aboriginal Clans Corporation received a $1.82 million Federal Government grant to research the viability of growing kangaroo grass. The Corporation has partnered with Dylan Male from Latrobe University, investigating the agronomy and ecology of Indigenous food plant species for a PhD project. The collaborators are looking at whether kangaroo grass could be produced on a mass scale by Australian farmers, anticipating the seed - once harvested - could become a regular ingredient in foods like bread, cakes and biscuits, while also contributing to healing of the land.

Themeda triandra—Kangaroo grass

Ancient Diets and Food Sources

Such an enterprise, i.e., producing edible grains from indigenous plant seed is hardly a new concept. In fact evidence points to the custom dating back for at least 30,000 years in Australia. According to the Australian Museum, seed grinding stones such as the one demonstrated below, have been found at numerous sites, including a stone from Cuddie Springs near Brewarrina in central north New South Wales dated at 30,000 years.

Grinding stone with top stone (muller) from Marra Station on the Darling River, NSW. Image: Stuart Humphreys, Australian Museum

Some of these food sources are not readily obtained, but depend on relatively complex processing technology. The charred remains of fruit endocarps in sites associated with human occupation points to the use of cooking to extract the fruit or dispose of the inedible portions.

> "Could native crop, kangaroo grass, become a regular ingredient in bread and help farmers regenerate land?" ABC News, 7.2.21

References

Florin, SA., Fairbairn, AS., Nango, M. et al., 2020. The first Australian plant foods at Madjedbebe, 65,000 – 53,000 years ago. *Nature Communications* 11:924 https://doi.org/10.1038/s41467-020-14723-0

Florin, SA. Roberts, P. Marwick, B. et al. 2021. Pandanus nutshell generates a palaeoprecipitation record for human occupation at Madjedbebe, northern Australia. *Nature Ecology & Evolution* 5, 295–303

Original story from "Kakadu food scraps provide ancient rainfall clues," *UQ News* - The University of Queensland, Australia

Wirimbili and Community Indigenous Garden

By Andrew Pengelly

Murnong—*Microseris lanceolata* —Yam Daisy
photo gardeningwithangus.com.au

IPHA has joined forces with the Wirimbili Aboriginal Cultural Centre and other community groups in the Kandos/Rylstone area of NSW, to plan and apply for funding for a community garden. The project is being coordinated by IPHA member Virginia Handmer, who works for the Mid-Western Regional Council.

The plan is to transform a vacant lot adjacent to the community centre to establish a sensory, medicinal and bush tucker garden highlighting plants and their uses from this region. The project aims to involve local community, Indigenous and non-Indigenous, targeting unemployed and lower socioeconomic demographic, NGOs supporting people with mental health issues, TAFE, Kids and Carers and more.

IPHA can play a role by recommending plant selections, assisting with educational brochures and signage, and holding workshops or field days. For starters, I (Andrew) have developed a list of health-promoting species for the area, which is reproduced in the following pages.

Health-Promoting Plant Species for Mid-Western region, NSW

Botanical Name	Common Name	Health-promoting qualities	Details, other uses
TREES			
Eucalyptus spp. *E. melliodora* *E. radiata* *E. dives*	Yellow box Narrow and broad-leaf peppermints		High-quality essential oils, leaves for medicinal use
Melaleuca spp. *M. linariifolia* *M. nodosa*	Paperbarks		High-quality essential oils. Hedges
Kunzea ericoides	Burgan		Source of kanuka honey
Leptospermum thymifolia *L. petersonii* *L. liversidgii* *L. polygalifolium*	Tea trees		Essential oils, Mosquito repellants, hedges
Syzygium spp.	Lilly pilly		Edible fruit, hedges
Callitris glaucophylla *C. endlicheri*	White cypress pine Black cypress pine		High quality essential oils
Ficus rubiginosa *F. coronata*	Port Jackson Fig Sandpaper fig		Fruit edible. Latex healing on skin
Hibiscus heterophyllus	native rosella		Flowers for teas, salads. Stems for fibre.
Brachychiton populneum	Kurrajong		Roasted seeds for coffee substitute
Exocarpus cupressiformis	Native cherry		Edible fruit
Alphitonia excelsa	Red ash		Leaves for medicine, soap
Melia azedarach	White cedar		Leaves for medicine. Insecticide
Backhousia myrtifolia	Cinnamon myrtle		Leaves for culinary use
Pittosporum angustifolium	Gumbi gumbi		Leaves for medicinal use. Hedges.

Key to plant use icons

medicinal edible aromatic topical use bee forage

Health-Promoting Plant Species for Mid-Western region, NSW

Botanical Name	Common Name	Health-promoting qualities	Details, other uses
SHRUBS			
Leptomeria acidula	Currant bush		Edible fruit
Tasmannia lanceolata	Mountain pepper		Leaves and fruit as culinary spice
Acacia spp.	wattles		Seeds, bark and gum exudate for food and medicine
Kunzea ambigua	Tick bush		Wind break Essential oil
Dodonaea viscosa	Hop bush		Leaves for medicinal use. Land regeneration
Styphelia triflora	Five corners fruit		Edible fruit
Bursera spinosa	Blackthorn		Medicinal uses
Callistemon citrinus *C. viminalis* *C. sieberi*	Bottlebrush		Essential oil, bird attractants. Ornamental value
Persoonia spp.	Geebung		Edible fruit, medicinal uses
Melaleuca thymifolia			Essential oil

Key to plant use icons

medicinal edible aromatic topical use bee forage

Styphelia triflora

Five Corners

Photo John Tann

Health-Promoting Plant Species for Mid-Western region, NSW

Botanical Name	Common Name	Health-promoting qualities	Details, other uses
CLIMBERS, GROUND COVERS			
Rubus parvifolius	Native raspberry		Edible fruit
Smilax glycyphilla	Sarsaparilla		Leaves are chewable, sweet
Eremophila debilis	Boobialla		Edible fruit, low quality
Billardiera scandens	Apple berry		Edible fruit
Clematis glycinoides	Headache vine		Leaves, seeds for headaches. Ornamental value
HERBS, GRASSES			
Microseris scapigera	Murnong, yam daisy		Edible and medicinal roots
Centipeda cunninghamii C. minima	Sneezeweed, old man weed		Medicinal leaves
Dianella spp.	Flax lily		Edible fruit.
Lomandra spp.	Mat rush		Edible leaf base. Weaving fibre
Themeda triandra	Kangaroo grass		Edible seed. Stock-feed
Bulbine bulbosa	Bulbine lily		Edible roots, ornamental value

Key to plant use icons

medicinal edible aromatic topical use bee forage

Smilax glyciphylla Native sarsaparilla

Billardiera scandens Apple berry

Photos John Tann

Indigenous Plants for Health Association (Inc)

"Awareness, Research & Development of Indigenous Plant-Based Products"

A Community Not for Profit Association

Indigenous Plants for Health

AGM and Spring Equinox Field Day

Saturday, Sept 25, 2021 10am – 8pm

Held at Kawalang, Murrays Run, via Laguna NSW

This field day includes distillation of native flora demonstration, ceremony and more.

All meals catered for with primarily local, organically grown ingredients, with vegetarian and gluten free options. Please advise if you have any specific dietary requirements.

Magnificent Sydney blue gums at Murrays Run

Full cost. Incl. lunch, dinner, morning and afternoon teas $80 pp. (IPHA Members $70)

Daytime events only, not including dinner or smoking ceremony $50 (IPHA members $40)

Free camping for Fri/Sat nights.

For registration please visit www.indigenousplantsforhealth.com

The venue is approx. 1.hr drive from Sydney and Newcastle, 1 hr. from the Upper Hunter Valley (depending on where you are!), 45 minutes from the Central Coast.

Note from the custodians of the property, Brynnie and Keith Goodwill.

We live on Wonnarua Country, among beautiful eucalyptus, casuarina and wattle forests with colourful mountain parrots, lyrebirds, kookaburras, black and white cockies, satin bower birds, wrens, so many others… joined by wombats, wallabies, echidnas, a snake or two and an occasional koala. It is suspected that there could be platypus in the stream down the hill though we have not met one yet. We live as sustainably as we can, with solar power, rainwater tanks, growing our own veggies, making soil from compost, chook (and our neighbour's horse) poo. We are keen to deepen our connection with the land and to welcome others to the abundance of Kawalang. For more information about our place, see www.kawalang.com

Event reminder – Carpooling

We would like to keep the footprint for the event as low as possible. If you are able to offer a ride, or carpool with someone else, please indicate on the registration form where you will be coming from. Please confirm that you are happy for us to link you up with someone from your area who will be traveling to the event.

Indigenous Plants for Health Association (Inc)

AGM and Spring Equinox Field Day

Saturday, Sept 25, 2021 10am – 8pm

Programme

10.00 am Registration, Welcome and morning tea

10.25 am Acknowledgement of Country

10.30 am Distillation demonstration of lemon-scented tea tree – Jeff Allen and Rob Santich

11.30 am Time to bee aware. Honey-bees and native "sugarbag" bees – Dani Lloyd-Pritchard

12.30 pm Distillation check-in

1.00 pm Lunch

1.30 pm Make your own bush remedies for insect bites and pain relief – Pat Collins

2.30 pm Annual General Meeting

3.30 pm Afternoon tea

3.45 pm From the Beginning - The Yengo-Baiame Story – Phil Sheppard

4.00 pm Growing food organically - demonstration – Keith Williams

4.15 pm Show and tell – plant/seed exchange

6.00 pm Dinner

7.15 pm Smoking Ceremony

****

Directions from Sydney M1 to Peats Ridge Rd and George Downes Dr to Walkers Ridge Rd in Kulnura

From Newcastle Pacific Mwy/M1 to Somersby. Take Peats Ridge Rd exit then as above.

From the Hunter you can go via Wollombi

Via Wollombi, take either Murrays Run Rd. on the left-hand side just past Laguna, or advance along the Great North Rd. and George Downes Drive until you come to Walkers Ridge Road, turn left, then take the third left about 2 kms later, onto Murrays Run Rd. Instructions as above.

Indigenous Plants for Health Association (Inc)

Speakers Bios.

Jeff Allen

Jeff Allen has worked with the distillation of essential oils, production of botanical extracts and processing of herbs for over 27 years. The core areas of his business are the design and manufacturing of distillation units and associated equipment for processing of plant extracts specialising in the distillation of sandalwood and other essential oils. He is involved in the development of businesses, mostly in remote locations, based on natural products, with expertise in machinery and marketing.

Rob Santich BHSc, Fellow ANTA

Rob Santich is a practicing herbalist with 35 years clinical experience and operates a busy herbal practice in Newport, Sydney.

Rob has taught herbal therapeutics for many years in both the major under-graduate Sydney Colleges, and held post graduate teaching positions with the former Graduate Diploma and Masters in Phytotherapy, University of New England, Armidale, NSW. He has served on the board of directors of the National Herbalist Association of Australia for 5 years and as a member of the Complementary Medicines Evaluation Committee, Therapeutic Goods Administration for 3 years. He has a special interest in ethnobotanical studies particularly Australian native medicinal plants and essential oils and remains a grass roots manufacturing herbalist. Rob also travels to the Pine Ridge Lakota Indian Reservation in South Dakota USA to learn Lakota ways, take part in ceremonies and learn traditional Lakota herb use.

Dani Lloyd-Prichard

Dani Lloyd-Prichard is a science communicator and educator with an obsession for bees. She's had a varied science career path starting with the Questacon Science Circus, the CSIRO Double Helix Science Club, water quality scientist, science teaching, waste management, worm farming, electric vehicles, bee research, University tutoring, beekeeper trainer, co-author of an AgGuide on Australian Native Bees, Flow hive prototype tester, iSee software trainer, founder and owner of Time to Bee, and co-presenter of the Bee Therapy podcast.

Dani is a member and past President of the Amateur Beekeepers Association of NSW and judges honey for the National Honey Show. Dani is a bee advocate for the importance of bees to sustainability on Earth, and she is constantly fascinated with the science of bees and beekeeping. She believes we can all reconnect to and regenerate the planet through bees.

Left and far left: Kawalang views

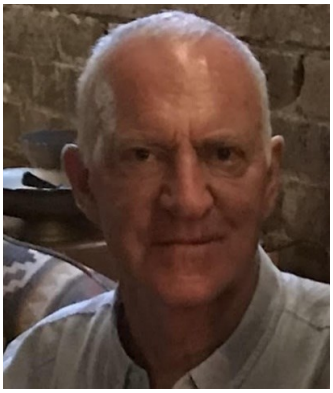
Indigenous Plants for Health Association (Inc)

Speakers Bios. cont...

Pat Collins

Pat was brought up in the Hunter Valley in NSW on dairy farms and that's where she learnt her love of the land.

After children she completed a Diploma in Herbal Medicine and then completed many other qualifications such as Iridology, Reflexology and clinical Hypnosis. TAFE and Outreach asked her to teach in the early 90's and she taught herbal courses for about twenty years. Also taught Naturopathic students for a few years at WEA College in Newcastle. Now teaches privately. At the same time she practices as a Herbalist and has her own Centre - Total Health and Education Centre at Muswellbrook. She has written 7 Books and a DVD to help teach her workshops and identify weeds as well as a book called "Bush Wise" as she loves her natives. Now Vice President and Treasurer for IPHA.



Phil Sheppard

Phil was born near Warrane (Sydney Cove) in Darug country, and has strong family ties with Darug, Gomeroi, Ngiyampaa and Wiradjuri peoples. He spent the bulk of his working life as an arborist-also, through TAFE, as a teacher in arboriculture, and indigenous conservation and land management. Phil has been privileged to sit down with a few Aboriginal knowledge holders to learn about the traditional medicine and bush foods of this country.

Keith Williams

With a background in ag science, developmental biology, biochemistry & molecular biology, Keith has worked in academia, pioneered 'proteomics' in the corporate world and writes about the transition to renewable energy, electrification of transport and climate change for online US business publication *Seeking Alpha.* He is most inspired, however, in the garden where he draws upon his family experience of growing food organically. He grew up in orchard country just out of Melbourne. Keith is a consummate planter of a wide variety of heritage fruits and vegetables.

Covid-19 statement

IPHA holds semi-regular field days, usually on properties belonging to one of our members. We have had to cancel some field days due to the Covid-19 pandemic, to ensure the welfare and safety of our members, and to support government and community efforts to respond to the pandemic.

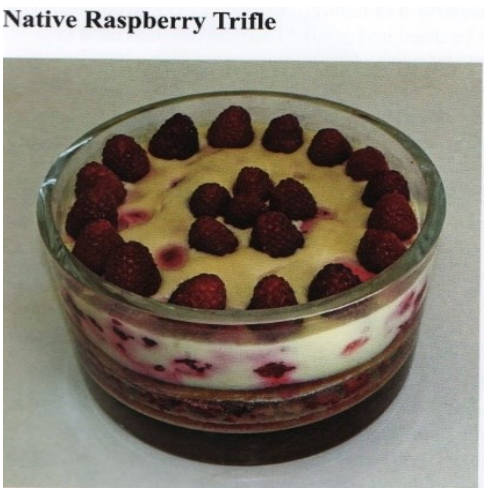
Be aware that future field days may have to be cancelled at any time due to government restrictions, or we may have to exclude members from specific states or regions in keeping with government directives. Any field day registrations that have to be cancelled by IPHA will be fully refunded.

Book Review

This is more like a bound folder than a book, however it is set out on glossy paper and the colour photos are outstanding. Maria Hitchcock is better known to many of us as the editor of "Save our Flora" Bulletin and owner of Cool Natives Nursery at Armidale, which specializes in cold weather and rare native species. The inside cover notes inform that the booklet was compiled for a bush foods workshop held in 2020.

Twenty bush foods are covered here, each profile featuring the description, distribution, propagation method – some expert tips here – and a generous section of mouth-watering recipes. Examples of recipes include cranberry muntrie slice or apple and muntrie puree (to serve with pork), kangaroo with quandong chili glaze, and the most attractive looking of them all – native raspberry trifle. I can't wait for the summer, when the bush raspberries are in abundance.

I tried the lamb cutlets with native mint dressing, using leaves of the *Mentha australis* that grows prolifically in my garden.



There is also a handy resource section at the back, with several web links for each bushfood covered, plus a concise list of suppliers of seeds, plants and spices.

For a mere $20 I recommend the booklet to all of our members, whether your interest is in cultivating bush foods or having a set of recipes to get the most out of our unique bush flavours.

It may be purchased online at coolnativesnursery.com

Edible Wattles

By Pat Collins

Acacias form an important component of the Australian bush with 956 species being recorded. There are very few ecosystems that do not house a wattle.

On Wattle Day—September 1st

I pick the small blossoms and put them into pancake batter to celebrate the day.

Central Australian aborigines ate the seeds of about 56 species including mulga (*A. aneura*). They would throw the pods on the fire to open them. Then once dry they threshed, winnowed, parched, pounded, ground and used the seed paste to make into cakes. They also loved the insect galls, the sweet exudates from lerp insects and the various grubs that inhabited the trunks and branches of the wattles. The gum was very popular and made into balls to create a drink or just eaten. In Victoria the gum was eaten more than the seeds.

Acacia aneura ANBG © M. Fagg, 2010

In Queensland acacia seeds were not as popular. They had a wider variety of foods and of the 240 recorded foods they ate only 2 types of wattle seeds.

Sydney Golden Wattle ANBG © M. Fagg, 1973

In the Upper Hunter where I live there are many varieties of wattles but only two are of particular interest.

The Sydney Golden Wattle (*A. longifolia*) and the Silver Wattle (*A. dealbata*) which have edible seeds. There maybe other varieties of wattles that have edible seeds but you need to know your varieties as some contain poisonous substances.

The Sydney Golden Wattle grows in sclerophyll forest and woodlands and grows in NSW and Victoria. It does not grow naturally in this area but I have planted this tree many times and collected the edible pods.

The Silver Wattle grows in high elevation in sclerophyll forest in woodlands in NSW, Victoria and Tasmania. Locally it grows at Barrington Tops, Liverpool Range and Coolah Tops. I have also planted this tree and collected its small pods.

They are both worth cultivating. I have collected the grubs from these and other wattles and always enjoy chewing the gum from our local trees (just ensure its clear). The blossoms from all varieties can also be eaten.

Wattles are also very useful for tanning. I have stripped the bark from my Silver Wattle (contains 29% tannins) and found it useful for tanning my rabbit skins. Sydney Golden Wattle also contains tannins but of a poorer quality and only good for tanning sheepskins. It is fun to experiment with your local varieties and some work much better than others.

When I'm cooking with wattle seeds I often buy Prickly wattle (*A. victoriae*) which is a favourite with all the restaurants. It has a larger seed and is very widespread. I have grown this wattle but the prickles complicate seed gathering. Coastal wattle (*A. longifolia var. sophorea*) also has good quality seeds. Wattle seeds have become very popular in the bush food industry with restaurants and exporters requesting a constant supply. They are used as a condiment having a chocolate-coffee taste and can be made into drinks, put into biscuits, ice cream or other dishes. Always roast the seeds well before grinding. If you roast the seeds until they are almost burnt they take on a coffee-like flavour. Wattle seeds contain 17 to 25% protein, 26 to 40% carbohydrates and 4 to 16% fat.

Below are two recipes using the blossoms and the seeds.

Prickly wattle ANBG © M. Fagg, 2010

Wattle blossom pikelets

1 cup plain flour

1 egg

1 dessert spoon sugar or honey

Pinch salt

1 cup milk

1 cup wattle blossoms

Collect fresh wattle blossoms that have just formed into yellow puff balls. Pull them gently off the branch. If you pick them after the dew has dried you do not have to wash them.

Mix all of the other ingredients together and beat well by hand until small bubbles appear on top. Allow to stand for 30 minutes then fold in your blossoms.

Grease your frypan well and drop a spoonful into the pan. Turn when bubbles break on top. Cook until golden brown.

Enjoy on Wattle Day!

A. longifolia subsp. *sophorae*
ANBG © M. Fagg, 2015

Our favourite is to mix a few tablespoons of Wattleseed Mud to 2 litres of vanilla ice cream and add a cup of chopped macadamia nuts. Enjoy.

Wattleseed Mud

110g wattle seed, roasted and ground

600ml water

This mud is made from the absorption of water by the roasted, ground wattle seeds over a very low flame. It is important never to boil the seeds as the flavour becomes dusty and bitter. The mud stores well in the refrigerator and will tolerate freezing.

Method: Cook wattle seed with water in an open stainless steel or iron frying pan to allow quick evaporation. Do not boil. Simmer, reducing volume by two-thirds, or until the grounds meet the surface of the liquid. Blend the cooked grounds in a food processor at high speed until they become a smooth mud. Scrape the contents of the blender into a clean container, cool and seal. Store in refrigerator. Use this to put into your ice cream, pavlova or other dishes.

Our favourite is to mix a few tablespoons of Wattleseed Mud to 2 litres of vanilla ice cream and add a cup of chopped macadamia nuts. Enjoy!

Above:

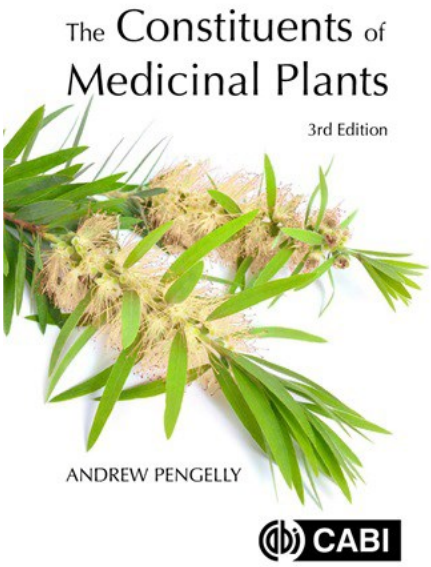
Silver Wattle *A. dealbata*
ANBG © M. Fagg, 2011

Left and Below:

Silver Wattle *A. dealbata*
worldwidewattle.com
B.R. Maslin

Indiger

New from CABI



The Constituents of Medicinal Plants

3rd Edition

Andrew Pengelly, Maryland University of Integrative Health, USA

Apr 2021 | 232pp

Pengelly's book is a classic in the literature of herbal medicine. It is an easy to understand introduction to the chemistry of medicinal plants. This new edition is thoroughly updated incorporating topics of contemporary interest, including cannabinoids, mushroom polysaccharides, and toxicology of phytochemicals.

A classic in the literature of herbal medicine, this book explains in simple terms the commonly occurring chemical constituents of medicinal plants, and how these react with the human body. The major classes of plant constituents, such as phenols, terpenes and polysaccharides, are described both in terms of their chemical structures and their pharmacological activities.

The last 20 years has seen huge growth in research output in phytochemistry, and this edition has been thoroughly revised to incorporate up-to-date research. It contains a new chapter on resins and cannabinoids, and additional content on macrocarpals, essential oil chemotypes, mushroom polysaccharides, phytochemical synergy, and toxicology of phytochemicals.

Features include:
· Over 200 diagrams of chemical structures
· Coverage of energetics, synergism and the emerging field of network pharmacology
· New content on seaweeds and fungi, and polyphenol-rich foods
· References to primary research literature in pharmacy, pharmacology, chemistry, plant biology, molecular biology, integrative medicine and many other disciplines

Written by an experienced herbal practitioner, *The Constituents of Medicinal Plants* has become a standard textbook for courses on plant-based medicine. It is also an essential desktop reference for health practitioners, lecturers, researchers, producers, and anyone with an interest in how medicinal herbs work.

PB / 9781789243079 / £25.00 £20.00 / €30.00 €24.00 / $35.00 $28.00
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Indigenous Plants for Health Association (Inc)

MEMBERSHIP APPLICATION FORM

Set out below are my membership application details for Indigenous Plants for Health Association Inc.

Enclosed/transferred is the sum of $20 annual membership fee. The amount has been paid by:

Cheque

Cash

Paid by Bank Transfer (Important flag your name with payment)

Post Membership Form and cheque to:

IPHA Treasurer, 196 Bridge St. Muswellbrook, NSW 2333 OR if paying by transfer you may scan and email the completed and signed form to Patricia Collins (patcollins196@hotmail.com)

Bank Details for Payments: BSB 637000 Account 722660722

Name: _____

Address: _____

_____Postcode_____

Tel: Home_____

Mobile_____

Email: _____

I agree to abide by the Constitution and any policies, rules or regulations established within the association.

These are listed on the website www.indigenousplantsforhealth.com

Signed_____

Date _____

IPHA Committee Members

President, Newsletter editor in chief: Andrew Pengelly
Vice President, Treasurer: Patricia Collins
Secretary, Newsletter editor: Reesa Ryan
Web, projects coordinator: Kathleen Bennett
Research Director: Sophie Ader
General members: Rob Santich
Phil Sheppard