

President's Message

After the welcome rainfall earlier in the year planting resumed in all areas of the Gardens. The plant curator, **Pat Offord**, recorded 383 trees planted and there were additional unrecorded plantings of Lomandras and ferns in the gullies, epiphytes and orchids on trees and in rockeries.

There have been several events at the Gardens this year beginning with the Upcycle Day in April at the Lismore Recycle and Recovery Centre which was combined with several guided walks and children's activities in the Gardens, BGANZ Botanic Gardens open day in May and World Environment Day in June.

Our gardener, **Damian Butler**, gave a very interesting presentation on invertebrates to the guides and other volunteers, many of the photos taken by Damian at the LRBG. He repeated this presentation to the Northern River's branch of U3A which is one of the organisations which helps publicise our events and activities by sharing our Facebook posts.

In July we honoured the late **Lionel Phelps**, former President of the Management Committee. His wife, Lenore and daughters Renata and Nerissa attended for a ribbon cutting to officially 'open' a new bench and to plant an honour tree in the Uncommon Plants Garden. The seat was installed by one of our building team, **Will Evans**, who based it on cobble stones - time consuming but with a very beautiful result. That morning was also a **special event for our volunteers**, first a guided walk for through the Wilson Park Reserve led by guide **Phil Jarman**, then a morning tea for volunteers and visitors at the Visitors' Centre.

An interesting and interested visitor this year was the Lismore City Council General Manager, **Shelley Oldham**. Thank you to members of the committee and volunteers who guided Shelley through the LRBG (and managed to keep to the timetable) in particular the plant nursery volunteers who provided morning tea.

The responsibility for the Gardens has returned to the management of the Waste Facility after two years with Civic Pride. Thanks to **Angie Brace** and **Anton Nguyen** for their help and interest over this time. Also, to many council staff who helped us during the past year with particular thanks to the staff of our immediate neighbours at the Waste Facility who are always helpful when we occasionally need advice or help with some task or event.

Following up on the signing of Master Agreement with Plant Sciences at SCU earlier in the year, research projects are being planned for early 2020. Also we made a visit to the Nightcap Ridge eco-tourism establishment at Dorrroughby. Here, we were guided by **Fraser Duddy** and the former owner, through 70 hectares of rainforest regen on what was once degraded land. A very enjoyable and informative morning.

I attended the AGM of the AAFBG at the RBG in Sydney in July and networked with representatives of Friends' groups from SE Queensland



Eurema hecabe, Large Grass Yellow Butterfly, drinking nectar from *Melaleuca armillaris* 'Mauve' in the LRBG 'Sunny Slope' (Image by Damian Butler)

who will be arranging tours at the time of their National Conference in Brisbane in May 2020. Another major event in May next year is Encounters 2020 (see p. 3).

Construction projects planned for the near future include a boardwalk in Room 5 and a permanent roof over the potting up area in the Nursery. Others awaiting planning approval or funding are amenities block at the Visitor's Centre, a bridge to span upper Fern Gully to facilitate access to Palm Gully, the Nursery and the as yet undeveloped area at high western end of the Gardens. A large wheelchair accessible deck in Commemorative Garden and a second cubby in the rainforest are also on our list.

And as always **special thanks to all the FLRBG volunteers** without whom none of this could happen.

Hazel Bridgett

Species profile

Blue Quandong

Family ELAEOCARPACEAE

Elaeocarpus grandis (syn. *Elaeocarpus angustifolius*)

Peter Gould

Description:

Blue Quandong is a large, fast growing tree attaining a maximum height of 35 metres and a trunk diameter of 2.0 metres.

Distribution:

It is a common element of riverine and lowland subtropical rainforest on alluvium and is often found growing along streams. Its range extends north from the Nambucca River to Queensland and Niu Guini. It is drought and frost sensitive when young and even quite mature trees can be seriously damaged by severe frost.

Leaves:

The glossy, dark green leaves are simple, oblong to elliptic, and 8–19 cm long by 1–4 cm wide. The leaf margins are regularly toothed and there are numerous small domatia. The petiole is 10–20 mm long.

Flowers:

Masses of greenish white “Lily of the Valley” like flowers appear as racemes in autumn. The flowers attract lorikeets and fruit bats.

Fruit:

The globose fruits are a striking deep blue and 20–30mm in diameter. It is eaten by several species of birds with large gapes including Wompoo Pigeons and Cassowaries. Though edible and sometimes listed as a bushfood the thin flesh is bitter and somewhat astringent.

Timber:

Blue Quandong is reputed to be one of the best bending timbers in the world. It has been used for light boat building, joinery, mouldings, lining boards and plywood. It is a light, fairly soft timber with medium to coarse, straight grain with little or no figure. It has a density of 495kg/m³ at 12%

moisture content; about 2m³ of seasoned sawn timber per tonne. While Blue Quandong is attractive and an excellent tree for farm forestry, streambank stabilisation and regeneration, it is not a good choice for home gardens. Its powerful root system can be a problem in urban areas.



This large old Blue Quandong growing on a stream bank beside the Protesters' Falls track at Terania Creek has well developed buttress roots. Blue Quandong is an excellent choice for creek bank stabilization.



Colourful old leaves are shed year round



The bark of a young tree growing in Room 5 at the gardens



Timber of Blue Quandong from Richmond River Historical Society collection

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Floyd, A.G. 1990, *Australian Rainforests in New South Wales, Vol 2*, Surrey Beatty & sons, Chipping Norton, NSW.
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Grant re Encounters 2020 Project

The Friends recently secured funding from the Maritime Museum in Sydney to help celebrate 250 years since the discovery by western science of the flora of New Zealand and Australia's east coast in 1769-70 together with more than 40,000 years of traditional plant knowledge.

Our Gardens are listed as one of the participating organisations. Our date is Friday 15 May 2020 which is when the replica Endeavour is scheduled to pass Byron Bay.

The Endeavour made landfall in eastern Australia south of where Sydney is today – Botany Bay. The people on the Endeavour actually didn't land anywhere else in New South Wales. Though, in his journal as they passed the Byron Bay area, Banks noted sighting Aboriginal people – walking along the beach carrying palm fronds. He noted that they didn't seem to notice the ship! However, fires were lit all along the coast which were visible from the boat indicating that the local people were indeed aware of this unfamiliar vessel and were sending messages ahead as it moved north. Cook is recorded as naming Mount Warning – though the local Bundjalung people already had a name for it – Wollumbin.

The Endeavour did make landfall at several places along the Queensland coast – Bustard Bay, the present day town of 1770, Thirsty Sound south of Mackay, Palm Island, north of Townsville and Cape Grafton – present day Cairns. And then an extended stay at present day Cooktown – while their ship was repaired.

Many of the plants collected along the east coast and named by Banks with European nomenclature are indigenous to this Northern Rivers area .

During the voyage of the Endeavour, pressings of over 520 new taxa unknown to western science were collected by Joseph Banks and Daniel Solander along the route up the east coast of Australia and these, along with thousands of botanical illustrations, somehow made it back to England in the face of shipwreck, waterlogging and the dank and humid conditions below



Sample of type of flora identification wheel

decks. The rich abundance of this diverse flora excited the botanic world.

With the support of the Bundjalung elders, Thelma James and Delta Kay and the Bundjalung of Byron Bay Aboriginal Corporation (Arakwal) and NSW National Parks and Wildlife Service, the Friends of Lismore Rainforest Botanic Gardens will use the grant to produce multiple, re-usable copies of four flora identification wheels for use by visiting school students. Over 200 schools visit the Botanic Gardens and the National Park each year.

These resources aim to:

- a) provide historical reference and understanding linking local plants to the story of Banks and Solander's journey on the Endeavour
- b) understand the basic process used to identify plants species
- c) develop a deeper understanding and appreciation for native plant species
- d) develop a deeper understanding and appreciation of the role Bundjalung Aboriginal people play in protecting Country.

The grant will also fund a new area at Lismore Rainforest Botanic Gardens featuring some of the plants collected by Banks.

Tracey Whitby



Tracey Whitby, Delta Kay and Lee Middleton meeting recently at The Pass Byron Bay to discuss the project

Wardian Case in the history of plant transportation

Throughout natural history the spread of plants around the world was mostly done - not by animals, birds, winds or the ocean currents, though they certainly were involved - but by human transportation.

From early 17th century at a time of world exploration and western colonization, moving plants to and from Europe, Africa, Asia, the Americas, the east and West Indies and later Australia and New Zealand and the Pacific Ocean Islands became big business.

The 'Old World' was fascinated by the exotic plants to be found in these 'new' countries and the English and European immigrants were anxious to recreate their homelands in their adopted lands.

Early plant movement involved mostly cuttings preserved, identified and named. However, almost from day one, seeds, live cuttings and even established live plants were transported across the globe. The success rate was not good. Poor storage, salt spray, extremes of temperatures, poor custodianship and just the length of time the plants were in transit, all contributed to the death of a large percentage of such plants before they reached their destinations. Although seed was moderately successful it too could deteriorate on a long sea voyage and even if arriving viable was often not successfully grown on by its recipients who lacked the propagation skills needed.

While various methods were tried to get the plants to their destination in good health – in temporary greenhouses on board – sometimes converted cabins - carrying plants in boxes below decks, moving them up to the deck to get light and fresh air when weather was appropriate was labour intensive and not very successful. Botanists and gardeners had believed plants needed to be exposed to fresh air on these long sea voyages.

Another problem was livestock onboard sailing ships – goats evidently ate the plants and rats did a lot of damage eating seeds and fruit etc.

Then in the 1830s there was a breakthrough. English physician and amateur naturalist Nathaniel Bagshaw Ward found a chrysalis in his London backyard and put it on soil in an enclosed glass jar to observe what it would become. By chance some small plants started growing in the soil he had put in the jar, so he decided to test how long plants could survive in enclosed jars with no additional water.

He ran successful experiments for four years and then with the support of prominent nurseryman George Loddiges, designed a miniature wooden greenhouse. It was 4 feet long, made of timber with a pitched, gable ended roof in which glass panels were inserted. It was decided that they would test the design by sending two boxes of plants as deck cargo on a voyage to Sydney.

Upon the ship's arrival at its destination, the ship's captain, wrote to Dr Ward with news of success. "You will, I am sure, be much pleased to hear that your experiment for the preservation of plants alive, without the necessity of water or open exposure to the air, has fully succeeded," he said.

The cases quickly became very popular and were used extensively by botanic gardens and European plant-hunters to move living plants from various parts of the world .

In Australia, nurseries promoted "new and rare plants carefully packed in Wardian cases".

When a load of English primroses arrived in Melbourne in the 1850s, 3,000 people came to witness the event and the police were called to



Wardian Case – Illustration from ABC RN web page

control the crowd and to create an orderly passage for the popular little flower.

The Wardian Case transformed plant transportation and was used world wide until the 1930s. There were two main reasons for its loss of popularity. One was the recognition that the cases were introducing invasive plant species. Creating its own microclimate a Wardian Case encouraged the survival of not only the plants but also insects and fungi and often damaging micro organisms. The other big reason was that international air transport very quickly superseded the need for the Wardian case.

References

<https://www.abc.net.au/news/2019-07-15/wardian-case>

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Marie Matthews

Butterflies are some of the most popular of the invertebrates. However, moths are far more numerous with an estimated 22,000 species in Australia alone. Butterfly species in Australia however number just over 400!



Damian Butler

Erosion Control at the Gardens – Update

Florence Trevorrow

PROGRESS

It is now two years since I wrote about our struggle to control erosion in the Fern Gully and Grandis Creek and much has happened. Although erosion control continues to be a problem we feel that we are making some real progress.

The coir logs that were across the flow have mostly disintegrated but in some places they were there long enough for stones and debris to build up to take their place. The coir logs that were placed horizontally along the creek edges are still in place and helping to prevent banks from eroding.

A lot of material from a couple of trees that fell and other debris were placed across the flow where we



The dams that formed up stream of Kevin's Bridge on Fern Gully Creek - near the western end of Rainforest Walk.

were trying to establish small dams. This has worked really well in some places and in the last heavy rain in

April the water was being held up and diverted.

LATEST DEVELOPMENTS

Unfortunately, every small victory comes with unintended consequences and, despite Graham's valiant effort to prevent the problem, Kevin's Bridge became seriously undermined. Also, the gully near Betty's seat continues to erode and there has been further erosion at the entrance to Grandis Creek, the crossing at the start of Rainforest Walk, and further down toward the confluence.

It was decided to purchase more coir logs and it turned out we could get some through the LCC works department as they use them in roadworks. These coir logs are smaller than the previous logs and this has meant they are more easily manoeuvred and placed in position.

After consultation with our building team, it was decided to fortify Kevin's Bridge with sandbags filled with dry concrete mix. Coir logs were placed on the sides of the gully just above and beyond the bridge. Also in the other erosion areas. On such occasions our motorised wheelbarrow and generator make a huge difference to the tremendous effort required by the volunteers. A lot of lomandras and palms were planted as well.



Coir logs in place in Fern Gully Creek



Installing sandbags at Kevin's Bridge and coir logs Grandis Gully



Children's Educational Activities in Gardens



So far this year our Children's Education Team have accompanied about 600 students on excursions to the Lismore Rainforest Botanic Gardens.

Each group usually comes for an hour or two and are different from each other in age and focus, and usually the children are excited, curious and engaged.



Margaret enjoying her work!

Very young Preschool Children are often in awe of the Hoop Pine Forest with such tall trees in a dark and shady place. After a short walk we offer activities –such as making pictures with leaves and flowers, looking for bugs in leaf litter with tongs and magnifying lenses etc and that adds to their adventure.

A recent group of **High School students** were investigating Environmental Science and Human Impact. So we began by studying maps of the Original Big Scrub and

noting the few remaining small fragments left after white settlement in the area. We then followed up with a walk in the main Rainforest area of Botanic Gardens to see the rainforest that has been regenerated here over 25 years on what was once a dump site. We also point out significant trees (that are now endangered) but which are thriving here in the Gardens. It was an eye opener to them and was encouraging to see how impressed they were realise that, with just volunteer effort, we can help change the tide of extinction.

A small group of **Japanese Students** visited as part of Lismore/Japan Sister City Relationship. I

think they did find it curious that we call our local Rainforest a "Dry Rainforest". A seeming contradiction in terms! However, we stopped on the bridge over the dry creek bed and explained that we have a wet season and a dry season here, and that rainforest plants here have adapted to cope with the hot dry periods. That did help explain the odd definition – I hope!!

Another small group of **High School Students with learning disabilities**

enjoyed a work experience morning planting, mulching, and sweeping pathways. Afterwards one young lad eagerly asked if he could now

get a job at the Botanic Gardens. It was a bit disappointing to tell him that everyone involved with the Gardens was a volunteer but I tried to encourage him to think of other gardening places that might offer work because he had definitely proven he was a worthy participant.

Another day the teacher accompanying a Primary School Group left a very encouraging note on our record sheet to say, "We have been looking at **biomes** around the world. It was great for the students to have an out of doors



Primary School students with deep concentration at work in the forest

experience and to get hands-on understanding of our local biome." That comment, I'd have to say, left me with a little homework to do!!

Open Days such as National Tree Day are also a pleasure to see all ages exploring our Botanic Gardens. As a new activity this year we tried a blindfold walk with children working in pairs – one blindfolded leading the other. They were encouraged to walk carefully, being aware of when they were walking in sun or shade, up slope or down, then, on finding a tree giving it a big hug to see if it was small or large, smooth barked or rough. On returning to start, they removed blindfold to see if they could find their tree again. The game proved to be lots of fun.

So I find the joy of discovery to be infectious when sharing time with children exploring the Gardens. It entices me to continue to volunteer again and again. If anyone is also interested in joining our Children's Education Group you would be most welcome. But be warned ...it might be fun☺.

Margaret Hildebrand



FLRBG members on walk in Wilson Reserve in July.

Gardens temporarily closed after fire at adjacent Recycling Centre

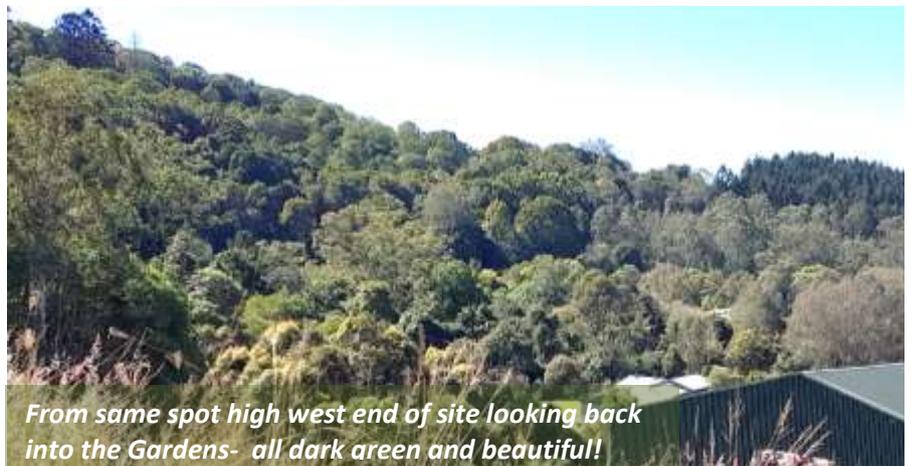


Burnt compost – being hosed and turned over to keep cool and wet.

In the early hours of 11 August fire broke out in the huge heaps of composting green waste at the Northern Rivers Recycling Centre which is adjacent to our Botanic Gardens.

The fire started when unusually windy conditions caused the compost piles to spontaneously combust. The fire also burnt part of the Materials Recovery Facility (MRF) and caused extensive damage to both the composting and recycling facilities.

This resulted in heavy smoke blowing across the Gardens and into the city of Lismore. The Waste Facility was closed as were the Gardens.



From same spot high west end of site looking back into the Gardens- all dark green and beautiful!

It was announced on Wednesday 21 that the fire had been extinguished thanks to Rescue NSW (FRNSW) aided by Lismore City Council staff.

However, neither the Gardens nor the Waste Facility was open to the public however, we were given permission by Waste Facility manager Charlie Crethar - to bring a small team in to do some watering. As we had planted around 400 plants in the previous couple of months we were very apprehensive about the

disaster we might find when we inspected the Gardens.

But miraculously in spite of the sometimes toxic smoke, the high winds on several days, a couple of intense cold mornings and an almost summer's day on the previous Monday... and absolutely no rain... the plants were all alive and healthy. We must be doing something right! They had been carefully planted, deeply watered, thickly mulched, protected with tree guards and many were in sheltered positions but even those that were in exposed places did all right. The Nursery had an automatic sprinkler system and also had little damage. So we all went home on Wednesday very much relieved.

The Gardens are still (27 August) not open to public or volunteers but we hope that will happen in very near future.

Marie Matthews



Some of the rescue waterers – Ros Little, Hazel Bridgett, Jan de Nardi and Florence Trevorrow. Marie and Denis Matthews were also there somewhere.

Update from National Botanic Gardens re cuttings taken from our Gardens in 2014

A report on progress of LRBG plant material transferred to the Australian National Botanic Gardens (ANBG) Canberra

It is now almost five years since my visit to your garden to collect cuttings of rare and threatened plant material for growing on in the living collection of the ANBG here in sunny Canberra. This had been prompted by our efforts to diversify the genetics of our threatened rainforest species' holdings and was facilitated initially by Pat Offord and on the day of the visit by Peter Gould. I would like to give you a brief update on progress since my last newsletter communication two years ago.

Six of the original nine species sampled in 2014 are now growing well out in the garden. *Davidsonia jerseyana* has proved itself an amiable addition to our collection, adaptable to sun or shade, extremes of heat and cold, unfussy about soil type, hardy to drying out once established and all this as well as its bush tucker attributes, distinctive foliage and growth habit. Older plantings (not sourced from your

garden) are fruiting regularly at 10 years in the ground and beginning to naturalise. Both the Rocky Creek Dam *Elaeocarpus*, *Elaeocarpus sedentarius* and the Hairy Quandong, *Elaeocarpus williamsianus*, have proved tough though extremely slow growing, though this is not unusual for the latter according to Dianne Brown the NSW OEH officer responsible for the species and who provided your original propagation material. Di also has been responsible for the recovery plan actions for the very rare Lennox Head *Fontainea*, *Fontainea oraria*, which included releasing genetic material to botanic gardens to establish secure ex-situ conservation holdings. The species recently had its status elevated to Critically Endangered under the federal EPBC Act in recognition of the precariousness of its future survival. Despite origins in subtropical littoral rainforest, 20 year old plants in the ground (sourced from the wild population) in Canberra are flowering and fruiting each summer.

Both *Macadamia integrifolia* and *M. tetraphylla* grow well in Canberra with some 50 year old specimens of the former producing abundant harvests each season. *M. ternifolia* is a species that has been growing in our garden since the mid 1990's and it was with great pleasure that we were able to send cuttings from our wild sourced plants to Rose Hand at your nursery in 2016 after it had been lost from your collection. Of great excitement for us has been our



Toby Golsen at Lismore Rainforest Botanic Gardens in October 2014

collaboration in efforts to secure ex-situ conservation collections of *M. jansenii* the rarest species in the genus. Currently, replicate collections of all known mature wild individuals are being propagated at Tondoon BG in Gladstone for distribution to botanic gardens on the east coast including ANBG and LRBG.

Once again, I would like to thank and commend all those involved with your garden. Such endeavours as LRBG not only bond and invigorate local communities but can become vital cogs in the safeguarding of our nation's floral heritage. I look forward to continuing our collaboration.

Toby Golsen - Senior Horticulturalist, Australian National Botanic Gardens,

FLRBG executive is:

Hazel Bridgett	President
Leanne Davis	Vice President
Florence Treverrow	Secretary
Marie Matthews	Treasurer

Our Committee is:

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Hairv Quandong, *Elaeocarpus williamsianus*,

The Possible Journey of the Boab Tree

The Boab Tree, *Andonsonia gregorii*, which grows in north of Western Australia and the Northern Territory, is not generally seen as a rainforest tree but it can be found in monsoon rainforest in these areas. It is the only tree of the Bombacaecae family found in Australia.



Boab Tree Western Australia. Photo abc.net.au

There is an ongoing mystery about how it came to be here. Its closest relatives are found in Africa and Madagascar 10,000kms of Indian Ocean away

Two scientists, Jack Pettigrew, University of Queensland and David Baum University of Wisconsin-Madison, USA have spent many years independently studying the Boab and its African relative the Baobab Tree. However, their conclusions so far differ in many aspects - especially about just how the Boab got to this country.

They do, however, both agree that Boab is not a Gondwanan remnant plant. The supercontinent broke up more than 120 million years ago, with Australia drifting north west and away from the African plate. Results of genetic analysis of the species on both sides of the Indian Ocean indicate that they are all too closely related to have been developing in isolation for that long a period.

Some of the research shows that the genus Adansonia split between 2 and 15 million years ago. Professor Baum suspects the Boab and its African relatives evolved

from a now-extinct common ancestor that grew somewhere in Asia.

Oceanic drift is a possible way the seeds could have arrived on Australia's west coast – maybe floating on an island of debris resulting from a tsunami near Africa – as seed pods or even live plants.

Professor Pettigrew suggests that his research indicates that the Australian species is extremely young – a mere 72,000 years old. He believes that there is a very good chance that humans introduced it to Australia

overland. That people moving out of Africa carried the tree's seeds as a valuable food source. Or even that that people came across the India Ocean by boat. 70,000 years ago water levels were up to 150 metres lower than now so many islands and sea mounts that are no longer above water would have been temporary places of refuge during their voyage.

He cites ancient rock paintings in the Kimberley in which Boab trees are occasionally depicted. He also has noticed similarities between the Kimberley art works and those of East Africa.

The research goes on. But both men agree that until fossilised seed, pods or pollen are discovered the route the Boab tree took to get to this country remains a mystery to be solved.

References

Article 'How did they get here?' by Alisdair McGregor, Issue 150 of Australian Geographic July 2019
Australaan Rainforest Plants 5 by N & H Nicholson published 2000 Terania Publishing, The Channon .

Marie Matthews

Aboriginal Plant Propagation

There is much documentation about the attitude of Australian Aboriginal people to the land - both spiritual and physical. The core belief of the oneness of the land and all that moves upon it... a deep knowing of a world in which humans, the landscape and the natural species are all part of the same ongoing life force. Australia's first people have cared for this land for tens of thousands of years, using it with awareness and at times altering the composition and structure of vegetation through burning and other sustainable methods. In fact early explorers described the Australian landscape as magnificent landscaped garden. Records relating to the way the local people intentionally propagated and dispersed plants are limited But they do exist and some are very detailed.



Harvesting Daisy Yams - Image anbg.com.au

The replanting of tubers after harvesting is well described. There are also some informative accounts of the movement, planting and nurture of important species, often involving ceremonial elements. This could involve assisted migrations, introductions and reinforcements and such activities spanned much of the continent. There is sufficient evidence to place modern translocations in a much older context of human-plant interactions. It enables a much broader approach to the valuation of 'natural' plant distribution in Australia.

References

Citation by J. L. Silcock "Aboriginal Translocations: The Intentional Propagation and Dispersal of Plants in Aboriginal Australia," *Journal of Ethnobiology* 38(3), 390-405, (1 September 2018).
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Laboratory rat of the molecular plant world

The majority of medicinal drugs in use today are derived from plants. In an article written for the Center for Biological Diversity Tuscon Arizona in 2008 Emily Roberson claimed – that 74% of the most commonly used drugs in the USA are plant derived.... “As wildlands are destroyed or degraded, we lose unique and precious species, from flowers to frogs to butterflies, and with them potential resources to combat hunger, poverty, natural disasters, and social and economic insecurity. This loss of diversity may also take with it important cures for diseases — both those we face now and those that may emerge in the future.” The current rate of global diversity loss is estimated to be 100 to 1000 times higher than the (naturally occurring) [background extinction rate](#) and expected to still grow in the upcoming years.

Wikipedia

A recent re-broadcast of a 2012 programme on ABC Radio’s Off Track programme focused on the Australian native plant *Nicotiana glauca*, a type of native tobacco. While not strictly a medicinal drug this plant has proven to be a wonder plant. To quote Professor Peter Waterhouse from QUT, (it is) ‘the ‘laboratory rat of the molecular plant world’.

Known as the Pitjuri plant by indigenous Australians, *N. glauca* grows in desert type country in west and north west of Australia and was discovered by ship’s surgeon and naturalist Benjamin Bynoe on ‘HMS Beagle’s 1837-38 exploration voyage, following Darwin’s well reported round world adventure. A specimen of the plant went to the Botanic Gardens at Kew where eventually it was named in honour of botanist George Bentham who described it in his *Flora Australiensis* in 1868. More recent investigation of the plant discovered that, having

developed in isolation with no threat from bacteria and viruses, it had no resistance to disease. In fact it has no real immune system. Instead of needing to protect itself from outside infections it had developed to survive extreme drought and heat. It sprouted quickly after even a minute amount of rain and produced large seed in record time. In the 1980’s *N. glauca* was used to diagnose and identify viruses, but it is now used in Universities, research institutes and biotechnology companies all over the world.

N. glauca is so widely used because it will readily take in foreign genes. Its rapid growth rate helps speed up research in testing vaccines and viruses. A 2016 report from the University of Kentucky indicates that it was used to create ZMapp, an experimental antibody cocktail (mixture of three antibodies), during an Ebola virus outbreak in Africa that was trialed on two French aid workers. Influenza vaccines have also been produced quickly and safely using the *N. glauca* plants.

“The cool thing about this plant is that it is easy to introduce foreign DNA using laboratory strains of viruses - and that is not trivial. Most types of organisms or cells need quite radical chemical and or physical methods to get DNA inside. For *N. glauca* it is relatively straightforward to make proteins for a range of different purposes or to knock down genes – that is switch them off or turn them down – for research purposes. Just placing a few droplets of virus/DNA solution on the underside of the leaf will do the trick”. *Jacqueline Matthews, Professor of Protein Chemistry, University of Sydney.*

Peter Waterhouse and his colleague Ming-Bo Wang won the Australia Prize in 2007 for their work on viral defence mechanisms and discoveries that plants use a process known as RNA interference (RNAi)

to silence genes from invading viruses (similar work on animal cells led to the 2006 Nobel Prize for Physiology or Medicine, awarded to Fire and Mello). Research with *N. glauca* was essential for teasing out the mechanistic details of this process and getting a better understanding of how RNAi can be used to modify gene outputs for many different plant species. One widely used variant of *N. glauca* has been engineered to produce a green fluorescent protein that can be used to easily track the spread of gene silencing through the plant. Current ongoing research with this plant is helping to identify how crop plants can be modified to increase properties such as yield, harvest time, drought tolerance, increased proportions of healthy oil or biofuels .

References:

Bally et al. 2018, “The Rise and Rise of Nicotiana glauca: A Plant for All Reasons. Annual Review of Phytopathology 56:405–26

<https://www.scienceinpublic.com.au/prime-ministers-prize/waterhouse-and-wang>
<https://www.qut.edu.au/institute-for-future-environments/research/research-centres-and-programs> Centre for Tropical Crops and Biocommodities (CTCB)

Trimming back shrubs on Sunny Slope

In July we had a visit from Dave Latta of **Accurate Tree Solutions** in Clunes. He and his offsider cleared and chipped the over tall and woody tea trees and similar shrubs in this area. They did a wonderful job, transforming the whole area! This results in big extension of the grassy area up to the creek so we can now look into the Useful Plants Garden from the western side. Closer to the road an area was cleared for the Banks-Solander planting to happen before the May Encounters 2020 event. Very generously, Dave didn’t charge us for this work for which we are extremely grateful.

Vulnerable native Rainforest Plants



Grevillea masonii

Years ago the original roadside shrubbery of *Grevillea masonii* was proudly protected by the Maclean Shire Council. Indeed our Botanic Gardens boasts a hedge of this indigenous shrub as gifted by the late Dave Mason, a local amateur botanist and Friend of our Gardens. It was subsequently discovered at several sites NW of Maclean, near the Grafton-Casino road. The Shire later protected the original roadside site on the Lawrence-Casino Road by bollards. So its security was assured from roadside grading.

However years later, during roadside spraying, the rare species was destroyed by an uninformed road works gang. Happily the bird attractant shrub was found later upon private land but remains vulnerable.

The vulnerability of our native plants remains an ongoing reason for such to be planted in botanic gardens.

Recently the ABC News (9/8/19) reported the accidental destruction of a rare stand of terrestrial native orchids in Gull Rock National Park, WA - south of Perth. The "highly coveted" stand was accidentally obliterated by a front-end loader during adjacent rehabilitation works within the park.

Sadly the site was unknown to the operator. Volunteers within a local conservation group, The Department of Biodiversity and the Orchid Society had kept the location secret

for fear of plundering. The destroyed stand of Queen of Sheba orchids was described by the WA Native Orchid Society as vulnerable.

This southern variant of a highly flamboyant orchid is prized by orchid lovers and photographers for its multi-coloured flowers in Spring. Its colouring is purple, apricot and with yellow stamens. There are three variants of this Queen of Sheba Orchid. Thirty of the two hundred known plants in the SW of WA were accidentally destroyed by the front-end loader event.

The relevant State department says "it will work more closely with local conservation groups to prevent further losses".



Phaius australis Swamp Orchid

Reminds us of our near-extinct native *Phaius australis* orchid once common on the Coolgardie Range, near Ballina, and now being propagated by the nurseries of Lismore and Coffs Harbour Botanic Gardens. It was plundered in its wild locations by orchid collectors until near extinction.

These reports illustrate the value of Botanic Gardens in the preservation of highly sought after native plants.

References....

ABC News Radio 9/8/019

Moye J. *The Blooming Orchid, Friends Lismore Rainforest Botanic Gardens, Third Edition 2015*

From Geoff Walker

Why Plant Trees on Farms?

NSW land-clearing laws allowed some 20 200 hectares to be cleared in 2016-17. This was *more than twice* the pre-existing average.

Recent article in the Sydney Morning Herald reported that "this legal clearing of land brought Eastern Australia the dubious distinction of being the only developed region as a world deforestation hotspot".

There are many reasons for trees to be retained or planted on farmland.

1. Shade is vital for livestock and native animals, and it reduces evaporation.
2. Trees increase the water-holding properties deep down in soil and add carbon content. Thus the soil stores water, cools the surroundings and sequesters carbon.
3. Apart from providing habitat and food for koalas, bats, insects and birds feeding on pests, trees provide habitat for fungi and microbes of the soil, essential for the growth of healthy plants.
4. Trees retain water underground and so reduce the effect of droughts.
5. The jury is still out but a strong theory is that forests of trees increase annual rainfall.

Adapted from article in the Sydney Morning Herald 10.8.19

From Geoff Walker

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AUSTRALIAN Rainforest Plants I

Nan & Hugh Nicholson



Nan and Hugh Nicholson recently published a new edition of their first book, Australian Rainforest Plants – In the forest and in the garden.

It illustrates and describes 113 species of trees, shrubs, vines, ground-covers and epiphytes. There are several new photographs and the latest name changes have been incorporated which have changed the alphabetical layout – such as Red Carabeen which has changed from *Geissois benthamii* to *Karrabina benthamiana*.

This 7th edition can be ordered (along with the other five books in the Australian Rainforest Plants series) from our website: <http://rainforestpublishing.com.au/index.php/publications/>

Special thanks to Hugh for his generous donations of high resolution photos of Rainforest Timbers of this area which we plan to include in a permanent pictorial display at the Gardens in the not too distant future

Thanks to Sponsors

We would like to acknowledge those who are supporting us financially and/or with their knowledge, skills and experience. Andrew and Jeni Binns, Janelle Saffin, Mavourneen Kennedy, Southern Cross Uni and local firms Ginger Blue Graphic Design, Hugh Nicholson, Accurate Tree Solutions, Wild Dog Dingo Services, Readings Engineering, Swan Bay Quarry, Wardell Turf Farm, Versacom, Trenches McKenzie & Cox Solicitors, and all who have supported us in any way including some who have requested to remain anonymous. We are very grateful to you all - we couldn't do it without you.

GUIDED WALKS are held at the Gardens on the last Sunday every month starting at 9.45am at Visitors Centre. Watch Facebook and Web page for details

ANNUAL GENERAL MEETING of FLRBG will be held at the EEC at the Gardens on **Saturday 19 October** starting at 9.30am **All positions will be declared vacant**

We are always looking for new committee members so please if you are interested let us know. Or just come along to the meeting. It is an exciting group to be involved with.



Lenore Phelps cutting the ribbon and planting the tree - with help from Damian, at the official unveiling of memorial seat for her husband Lionel



Michael O'Shea and Will Evans getting started on sorting out cobbles for new seat base



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