Reverence for the bunya bunya: A seasonal retrospective from Melliodora

Dedicated to the memory of Peter Brew 1954-2010

Figure 1 Classic bunya bunya canopy profile at the Bunya Mountains National Park (photo Oliver Holmgren)

Equinox gift from the subtropics

It feels like a classic autumn break after a horrible gardening season with alternating cool and scorching hot dry conditions, insect plagues and disease. We've had a series of nice rains bringing the first germinating winter clovers, grasses and lush annuals that most people call weeds. It will soon be chestnut harvest time (if we can net some trees against the sulphur crested cockatoos). Soon we will be eating roast chestnuts for breakfast; a small but significant implementation of the permaculture vision of tree crop staples providing a larger part of diet to reduce dependence on wheat, potatoes and other annual staple crops that dominate world food supply.

This autumn the starch nut-roasting season arrived early with a special parcel from our son Oliver; five kilograms of bunya bunya (*Araucaria bidwillii*) nuts from the Australian subtropics. He had just returned to his share-house in Brisbane with a ute load of fresh nuts from the fabled Bunya Mountains. What a treasure, and a treat that most Australians have never tasted or even heard of. Bunya nuts are about the size and appearance of a Brasil nut (without the banana bend) but with a flavour halfway between a roasted chestnut and a pine nut. Nutritionally they are rich in starch like a chestnut (unlike most nuts that are oily and rich in protein).

Figure 2 Oliver with football size bunya bunya cones, mature tree in background(photo Kate van Wezel)

Figure 3 Roast bunya bunya nuts on the woodstove at Melliodora (photo David Holmgren)

Feast is the order of the day because bunya nuts do not keep as long as most nuts before being subject to off flavours and nasty moulds. In the now largely cleared bunya bunya forests of the Maleny plateau, indigenous peoples came from a huge territory to share the feast that was possibly the greatest concentrated carbohydrate food source anywhere on a continent largely devoid of abundant and such concentrated food. While the macadamia nut is recognised as Australia's only significant contribution to world horticulture, the

massive bunya bunya pine that comes from the same subtropical forest ecosystems remains uncultivated for food despite its great potential.

After nearly thirty years of growing interest in, and commercialisation of 'bush tucker' in Australia, I find it incredible that so few people, even in Qld have ever tasted bunya bunya nuts. That Oliver, a blow-in permie from Hepburn Springs in the cool temperate south was able to rock up to the iconic Bunya Mountains and easily collect a ute load of nuts to wow his housemates and friends in Brisbane indicates how little this great food source is valued.

Permaculture History with bunya nuts

Oliver has eaten bunya nuts for as long as he could remember. Most of those came from permaculturists visiting Melliodora from the subtropics although some were foraged from rare stands of planted trees in southern Australia that produce nuts. When he was four years old he helped us plant a stand of bunya bunya pines on public land adjacent Melliodora (part of the Spring Ck Community Forest). The trees were raised from seed selected from one of those early batches of nuts from SE Queensland. Those trees joined two I planted in 1986, that were gifts from Peter Brew, a friend on the far south coast of NSW. Those two trees survived a minus eight degree frost in 1989, a frost that killed some of our plantings of local indigenous trees. Peter and I already knew bunya bunyas were very frost resistant. In an earlier fit of optimism he had given me a few trees to plant at my mother's Wyndham property where a yellowing of the spiky foliage, was the only sign of stress from repeated hard frosts in the drought winter of 1982.

Peter pioneered the cultivation of many subtropical tree crop species on his Mt Darrah property 700m above sea level in the "thermal belt" above the frosty Tomomba valley. In those years he and I exchanged information about our mutual passion for tree crop horticulture well as conservation, sustainable forestry and building, ecological theory and the energetic basis of human sustainability. Peter was an independent thinker and a practical innovator never recognised for his brilliance by his peers or society.

Figure 4 David exploring the Tomomba valley with Peter Brew 1985 (photo Su Dennett)

Peter's original trees in the Melliodora grove showed female cones for the first time in 2012 following the breaking of a ten-year drought. This year (2014) during a tour of Melliodora by the VEG (Very Edible Gardens) PDC students, Adam Grub spotted a full cone at the base of the largest tree. Although all the nuts were blank I have every confidence that before they reach thirty years of age one of their kin will dust their

female cones with the pollen needed to set the nuts. It was not chance that Adam was the first to spot the cone because his bunya foraging in urban Melbourne has been almost as successful as Oliver's in Qld.

Figure 5 David and Adam with first cone produced by Araucaria bidwillii in Spring Ck Community Forest (photo Dan Palmer)

I first tasted bunya bunya nuts after foraging them from a productive grove in Hobart Botanic Gardens in the autumn of 1975, during one of my early botanical explorations in search of potential tree crop species for Tasmania's cool temperate climate. I had already begun to write the manuscript that later became *Permaculture One* published in 1978. A significant part of that work involved rediscovering the great range of useful species, especially tree crops that had the potential to diversify and sustain world food supply in the *Limits To Growth* era.

J. Russell Smith's classic text from 1929, *Tree Crops: A Permanent Agriculture*[1], is widely recognised as a major influence in developing the permaculture design concept. Less well known influences were the economic botanists of the late 19th century who were earlier on the path of recognising the value of undeveloped tree crops. Most notable in Australia were Joseph Henry Maiden and Baron Ferdinand von Mueller. The facsimile edition (1972) of Maiden's 1872 reference *Useful Plants of Australia*[2] was our best source on Australian indigenous species. Mueller, our greatest botanist and proto-ecologist, was largely responsible for the huge specimen bunya bunya pines in most regional botanic gardens and many public parks throughout south eastern Australia[3]. Unfortunately most of these trees don't bear nuts because bunya bunyas are apparently self-infertile, requiring pollen from another tree. Barren trees were, no doubt, the

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[1] David talks about this permaculture classic here.
https://www.youtube.com/watch?v=Y7gOr7AzUUU
The facsimile copy of the book can be viewed here.
https://archive.org/details/TreeCrops-J.RussellSmith

[2] The facsimile copy of the 695 page tome is also available here.
https://archive.org/details/usefulnativeplan1889maid

[3] For his full biography, see here.
http://adb.anu.edu.au/biography/mueller-sir-ferdinand-jakob-heinrich-von-4266

intention of the early gardeners who did not want the giant pineapple like cones endangering park visitors and passers by (one cone weighing up to twenty kilograms falling from a height could do a lot of damage, wear helmet to harvest!!).

Well before the Australian dry sclerophyll vegetation became fashionable, these plantings with their spectacular form and dense green spiky foliage, were, along with many other Australian rainforest trees, part of the Victorian era's fascination with native species that reflected the imagined Rousseauian jungle paradise of the South Pacific.

While it was Victorian fashion and affluence that gave us these plantings, the botanists who collected, propagated and spread them were part of a larger project centred in Kew Gardens by which the British empire was building on the massive economic and sustainability benefits from previously unknown and little used species. In the early decades of the 20th century this strong interest in economic botany waned as oil took over from coal to supercharge the global industrial economies. Apart from a short resurgence in the economic upheavals of the 1930s and the energy crises of the 1970s, interest in new and under-used species has been at a low ebb, with research money and resources funnelled into overbreeding and now genetic engineering of the same few staple crops that still dominate world agriculture.

Of course Permaculture was part of the 1970s wave of renewed interest in under-used tree crops, and for me the bunya stood out as the premier species for many reasons. While Hobart Botanic Gardens in the 1970s also hosted an old seedling macadamia that also bore nuts, the majestic size, vigour and hardiness of the bunya bunya pines and their duel potential as timber and food trees, were much more impressive. Most significant was the large size of the edible nut from seedling trees without any horticultural selection and the fact that the massive cones fall apart after a short time on the ground making harvesting easy. The downside, other than the grave danger of falling food, was the long cycle to bearing, at least 20 years in temperate climates. Rather than any attempt to turn the ancient Araucarias into tamed grafted orchard trees like the macadamia, I always imagined the bunya bunya as the overstory tree of an heirloom food and timber forest. In this regard I am of a similar mind to fellow tree crop "nut" and author Louis Glowinski who waxes lyrical about the horti-cultural and culinary delights of the bunya bunya[4]

Over the years and decades my understanding of the potential range of the *Araucaria bidwillii* has extended with hardy specimens on Riverina homesteads in semi arid NSW but all my observations of old established specimens seemed to be on deep well-drained soils of high or at least moderate fertility. This seemed logical for a tree native to volcanic soils producing such a huge nutrient dense seed[5]. In the mid nineties I discovered a mature, if nuggetty, tree growing in a garden at Fryerstown. The fact that bunyas were also capable of this and able to scavenge enough fertility in the process decades after any caring gardener had fed and watered the tree was astonishing to me. This and several specimens in Castlemaine on goldfields sandstone reef country (essentially no topsoil) where the native box trees seek moisture by following the rock fracture lines to great depths, proved these bunya trees can grow on some soils that no horticulturalist would consider fit for any tree crop (with the possible exception of olives). The bunya bunya has restored some of my naïve permaculture optimism of the 70s that it might be possible to establish food and fodder forests across some of Australia's harsh and infertile landscapes that so far have only supported rough pasture or tough sclerophyll forest with minimal food and fodder potential. I don't want to overstate the case but in the same way that my observations of oaks in central Victoria over the last three decades have increased my confidence in the potential of many useful exotic species to survive and thrive in these tough

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[4] Glowinski, L. *The Complete Book of Fruit Growing in Australia* Lothian 1991

[5] For more info, see page 13 of *Food Safety of the Australian Plant Bushfoods*.
http://www.sgapqld.org.au/bush_food_safety.pdf

The potential use of bunya nut extract as antibacterial food preservative is discussed here.
http://www98.griffith.edu.au/dspace/bitstream/handle/10072/46944/78134_1.pdf;jsessionid=0B461998F69CD39956EFEC98024BD6E6?sequence=1

landscapes, the magnificent bunya bunya literally and figuratively stands head and shoulders above any native or exotic tree in its potential.

Araucarias, Dinosaurs and Fire

The fact that the bunya bunya was found in the Bunya Mountains and the Maleny plateau in SE Queensland and a few pockets of north Queensland at the time of European settlement is an artefact of recent ecological history of this species that belies a much grander and more ubiquitous history of *Araucaria bidwillii* and its relatives in the south pacific. *Araucaria araucana,* Monkey Puzzle, bears a nut similar to the bunya bunya in the high Andes. It is sacred to the Mapuche people of southern Chile who name it Pehuén. Of similar form to *A. bidwillii*, it grows at the tree line in southern Chile and Argentina above the stunted *Nothofagus* that shares its habitat. It is hardy enough to survive maritime northern hemisphere winters as far north as Norway.

In south east Brazil, the third nut bearing, Paraná Pine, *Araucaria angustifolia*, occupies hill country with a climate not dissimilar to the Maleny plateau and Bunya Mountains. Its upswept branches contrast with drooping branches of mature bunya bunyas. According to Wikipedia the 3,400 tonnes of nuts collected annually in Brazil threaten the regeneration of the species[6] but in the forests I visited, the ground was covered with unharvested nuts.

Figure 6 *Araucaria araucana* at the tree line (2000m asl) on the Chilean/Argentinian border below the Lanin volcano growing with stunted deciduous *Nothofagus* (photo David Holmgren)

[6] http://en.wikipedia.org/wiki/Araucaria_angustifolia

Figure 7 Parana Pine, *Araucaria angustifolia* in mixed forest at Santo Antonia do Pinhal in SE Brazil at 1200 asl (photo David Holmgren)

Visiting these forests and eating the nuts of both species in 2007 was part of a pilgrimage to stand in awe of these great trees that are part of the Araucarian linage stretching back more than 180 million years when they must have been food for nut eating dinosaurs. There are another 19 species of Araucaria (as well as another eleven that are now extinct) but none produce edible nuts of significance. They include the Queensland Hoop pine (*A. cunninghamii*) grown for its timber, and the familiar Norfolk Island Pine (*A. heterophlla*), one of the worlds most hardy and resilient seaside trees able to ignore the salt spray and survive the worst of storms without damage or deformation. Growing up in Fremantle, the horizon views of my childhood from any high point were always dominated by great Norfolk Island Pines. They are the only large tree that the Fremantle city council will accept being planted as street trees in the coastal zone. The size of these trees growing in a Mediterranean climate with far harsher onshore salt winds than they receive in their sub tropical summer rainfall home on Norfolk, reinforces the hidden characteristics of the ancient Araucarias.

Figure 8 Norfolk Island Pines planted on the ocean foreshore Kiama southern NSW (photo David Holmgren)

For comparison, eucalypts all evolved from primordial parents a mere 2 million years ago and only came to massively diversify (nearly 600 species) and dominate the Australian continent in the last 100,000 years. The ecological niches where botanists found the bunya bunya and the other Araucarias, like the more recently discovered relative, the Wollemi Pine (*Wollemia nobilis)*, were refuges from fire more than any other factor. These slow growing forest giants cannot cope with serious bushfire and are slow to reproduce and spread. The large bunya bunya nut quickly sprouts if it falls on moist soil to form an underground tuber from which the green shoot later emerges. The young trees grow very slowly and need a sheltered forest environment before they become hardy to drought, sun and wind. By comparison eucalypts are fire pioneers that shed masses of fine seed on ash beds following bushfire or re-sprout from epicormic shoots buried under protective bark or even tougher lignotuber shoots from ancient woody root masses that may be many times older than the above ground tree. They thrive in sun and wind from a young age.

Food Forests for the Energy Descent Future

The role of humans over the last 50,000 years of occupation of this continent in the relative distribution of rainforest giants such as the bunya and the fire-adapted eucalypts remains a subject of scientific debate. If the die-off of the megafauna over the last 100,000 years from climate change and/or human predation did unleash the fire genie on this continent, then the demise of many rainforest species and the survival of others such as the bunya in fire protected refuges makes sense. The term rainforest species is misleading, as the drought hardiness of many, including the bunya bunya, is as great if not greater than many eucalypts and other species of the fire ecologies that replaced them. The structural distinction of the so-called rainforests is that they have closed canopies with densities greater than 70% while almost all eucalypt forest are open (30-70% canopy density). Ecologically the so-called rainforest are distinguished as non fire ecologies that over time build soil organic matter, water and nutrient holding capacity that all contribute to a greater resistance to fire. In stark contrast the eucalypts actively encourage the spread of fire and are mostly poor soil builders.

The taming of fire by the ancestors of modern aborigines certainly crafted a human friendly and food producing landscape from fire ecologies, to an extent that has only recently, been well acknowledged[7]. In the

[7] See Gammage, B. *The Biggest Estate on Earth: How Aborigines Made Australia* Allen and Unwin 2011 provides the most complete historical evidence of Australian indigenous landscapes being “man made”.

process, human management may have been the reason that pockets of non-fire ecologies dotted the Australian landscapes, home to relic plant and animal species that also provided special foods for people. The great bunya bunya forests are surely the most spectacular of these. There is also some evidence that indigenous people were responsible for the establishment of stands of bunya bunya well removed from natural refugia. The botanists of the 19th century and bush tucker permaculturalists since the 1970s have certainly planted the Araucarias that may recolonise a continent long after humans have followed the dinosaurs to extinction. To extend our tenure on this earth, an alliance with the great nut bearing Araucarias may provide us with sustenance from groves and forest covering the landscapes we can no longer manage once exhaustion of fossil fuels reduces our power over nature. I can think of no better inheritance to leave our descendents.

Figure 9 Freshly fallen cone at Bunya Mountains National Park Queensland (photo Oliver Holmgren)

Bittersweet reflections

One of the critiques of permaculture is that, in attempting to be a theory of everything, it has failed to contribute real progress on any of the manifold fronts it addresses. Had Mollison and I spent our lives planting, managing and selecting oaks and bunya bunyas, we might have made a greater contribution to a benign energy descent future. On the other hand, we have inspired many others, a few of whom have contributed significantly to the still very slow expansion of knowledge of, breeding and use of tree crops. Peter Brew was one of those few, a keen observer, independent thinker and energetic practitioner whose potential to contribute to a better energy descent future for humanity through tree crops, was cut short by personal misfortune exacerbated by an affluent but ignorant society unable to recognise, let alone reward, genius. When Oliver and I harvest the first nuts from the Spring Creek Community Forest grove, I will start a new nursery bed to contribute to the hybrid vigour of the future bunya bunya groves of southern Australia to honour Peter's contribution to an abundant future.

David Holmgren

Autumn equinox 2014

Melliodora