

Article Submission to IP Australia regarding their consultation on Indigenous Knowledge and its protection.

Title: Identifying and Preventing Biopiracy in Australia: Patent trends for plants with Indigenous Australian uses

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**Abstract:** Indigenous Australians have lived in and off the Australian continent for at least 40,000 years meaning their knowledge of locally found plants and animals is unparalleled. This knowledge has ecological significance, with land and 'bush' management techniques employed historically and currently, having important effects for the stewardship and conservation of biodiversity. In the last 20 years, there has been an increasing commercial interest in exploring options for the use of native plants for food, food additives, botanical medicines, and related purposes. The ethical commercial use of these could have benefits for communities and conservation, whilst use without consent and benefit-sharing is likely to attract criticisms and claims of biopiracy. The paper reports on an analysis of the plant-based Indigenous Australian knowledge 'patent landscape,' including identification of several patents of potential new biopiracy concern. It highlights the way that private actors (individuals and companies) are appropriating both 'sovereign' and Indigenous rights recognised biological resources and associated knowledge, through attempts to gain private property monopolies. It then makes some recommendations about how to improve the access and benefit sharing (ABS) and intellectual property laws affecting this knowledge and the associated biodiversity.

**Keywords:** Indigenous knowledge; Aboriginal and Torres Strait Islander Australians; biological resources; patent trends; biopiracy; access and benefit-sharing; Nagoya Protocol.

## **Identifying and Preventing Biopiracy in Australia: Patent trends for plants with Aboriginal uses.**

### **1. INTRODUCTION:**

Indigenous Australians traditionally used more than 200 plant species as food sources (Lee, 2012) and probably even greater numbers of medicinal plants (Lassak and McCarthy, 2011). Indigenous Australians have lived in and off the Australian continent for at least 40,000 years – up to possibly 100,000 years – meaning their knowledge of locally found plants and animals is unparalleled. This knowledge has ecological significance, with land and ‘bush’ management techniques employed historically and currently, having important effects for the stewardship and conservation of biodiversity (Yibarbuk et al., 2001; Moorcroft and Adams, 2014). The impact of colonisation and the subsequent displacement and disconnection of people both from their lands and from their families has had a significant effect on use of traditional practices affecting plant use for foods and medicines (Oliver, 2013). Despite this, there is still much Indigenous Australian knowledge held by individuals and communities as well as significant amounts of knowledge that has been documented and entered into the ‘public domain.’ The dissociation of Indigenous knowledge from the customary laws and norms of communities, and their physical, geographical and cultural context is a significant concern of many Indigenous communities (Drahos, 2014). On the other hand it is likely that much knowledge would have been lost if it had not been documented by ethnobotanists and the communities themselves (Clarke, 2003; see Conservation Commission of the Northern Territory series of the early-mid 1990s). Depending upon the intent and activities of researchers, the process and ethics of researching in or with Indigenous communities by non-Aboriginal researchers has also been questioned and criticised (Raven, 2012; Holcombe, 2012; Smith, 1999). The resulting ‘disclosures’ of knowledge in publications may at first seem relatively harmless, but the removal from customary regulations and contexts into the realms of ‘public domain’ and also private property rights can have harmful effects (see Robinson et al. 2014).

In the last 20 years, there has been an increasing commercial interest in exploring options for the use of native plants for food, food additives, botanical medicines, and related purpose (Gorman et al, 2006). Coupled with this, there have been policies and research focused on improving livelihoods, work and economic opportunities through the development of ‘bush foods’ and related products (e.g. the research of the Desert Knowledge CRC). However, the success of these policies has been questioned and the inclusion of Indigenous Australians as beneficiaries under ‘fair and equitable terms’ has been repeatedly raised (Walsh and Douglas, 2011; Lee, 2012; Gorman et al. 2006; Drahos, 2014; Cunningham et al. 2009). While Indigenous Australian’s have benefited from wild harvesting of products such as Kakadu Plum and Australian Bush Tomato in terms of modest financial gains, as well as for improvements to wellbeing and self-esteem, questions remain about the ‘rights of the heredity custodians to have a say in the [commercialisation] process, and to the protection of their collective birth-right to the [intellectual property] IP contained within such products’ (Lee, 2012, p359).

The economic dimensions of inclusion in commercialisation are of obvious importance to Indigenous communities, and ‘terms of participation’ in agri-food production has often been highlighted as an important point of analysis for understanding poverty alleviation in agri-food value chains (see Bolwig et al, 2010). The customary and cultural dimensions of bush

food commercialisation may not always be so obvious to non-Indigenous Australians. As Lee (2012) explains, certain clans or people would be attributed as the ‘rights-holder’ or ‘owner’ of the resources that could be collected from a certain area and the gathering and consumption of bush foods and medicines was conducted, not simply for nutrition and treatment alone, but within a holistic context of social structures, belief systems and survival strategies (Clarke, 2011). Using the example of the ‘Bush Tomato’ (*Solanum centrale*), Lee (2012) note that it has played an important role as a totemic and ritual entity, as well as being a food, in traditional Indigenous culture and lore (also Alyawarr speakers from Ampilatwatja et al. 2009). Totemic species may be ascribed customary usage restrictions by the totem-holders.

These are concerns of global significance, affecting Indigenous people around the world and spurring new developments towards ‘biocultural rights’ (see Bavikatte, 2014). Considerations surrounding the ethical, ‘fair and equitable’ use of a plant or animal and associated Indigenous knowledge have been negotiated internationally, having been first recognised in international law through the Convention on Biological Diversity (CBD) in 1992. Since that time, the emergence of the discourse and issue of ‘biopiracy’ has highlighted the misappropriation of the knowledge of Indigenous peoples, local communities and farmer’s groups relating to biodiversity – typically through research, development and commercial use of specific species or varieties of plants or animals (Shiva, 1993; Robinson, 2010). While the CBD recognises state sovereign rights over genetic resources to be utilised for research and development (R&D), the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization* (Nagoya Protocol) to the CBD goes further in recognising Indigenous rights over genetic resources and traditional knowledge (albeit using ambiguous language).

As Australia deliberates on whether to ratify the Nagoya Protocol – it has signed, but the ratification process has stalled since the federal Liberal-National coalition government came into power – it is worth considering its biogeographical wealth (an isolated mega-diverse continent) as well as the extensive and diverse Indigenous knowledge that the 400 distinct language groups of Aboriginal and Torres Strait Islander people have generated and retain (Horton, 1994). This paper highlights why it would be useful for Australia to ratify the Nagoya Protocol, in terms of national benefit, as well as to specifically benefit and protect the knowledge of Indigenous Australians. It does this with some cautious optimism about the ways in which the Protocol would be adopted in Australia, with reference to existing laws that regulate ‘access and benefit-sharing’ (ABS) at the state and federal level. To do this, the paper reports on an analysis of the plant-based Indigenous knowledge ‘patent landscape.’ The patent landscape provides a novel way of identifying R&D or discovery on bush foods and medicines with potential commercial application. It highlights the way that private actors (individuals and companies) are appropriating both ‘sovereign’ and Indigenous rights recognised biological resources and associated knowledge, through attempts to gain private property monopolies.

## **2. AUSTRALIAN LEGAL GEOGRAPHIES OF BIOLOGICAL RESOURCES AND INDIGENOUS KNOWLEDGE:**

The third objective of the CBD is for the ‘fair and equitable sharing of the benefits arising out of the utilization of genetic resources’ (CBD, Article 1). While the CBD text created new opportunities for recognition of the rights of Indigenous peoples associated with biological

resources and traditional knowledge (Article 8j), the ABS provisions were highly equivocal. The Nagoya Protocol has since advanced these legal recognitions, albeit with its own uncertainties. For example, the Protocol requires prior informed consent for access to genetic resources from Indigenous peoples 'where they have established rights' over those resources (Article 6). Despite ambiguity over the scope of 'genetic resources' from the CBD in 1992, Australian government policies and laws have always taken a broad interpretation, typically defining ABS rules around 'biological resources' including biochemical extracts from those resources. This is now accepted internationally in Articles 2 and 3 of the Nagoya Protocol. In addition, there are several other important elements of note in the Nagoya Protocol text:

- The Protocol extends access rules to traditional knowledge associated with genetic resources (Article 7).
- Article 12 asks Parties to consider the customary laws and community protocols of communities, with respect to traditional knowledge associated with genetic resources.
- It establishes an ABS clearing house mechanism where permits and evidence of legal access can be deposited and checked as a transparency measure.
- There are measures for Parties to ensure compliance by users with respect to their access of genetic resources (and associated traditional knowledge) in foreign country Parties to the CBD (Articles 15 and 16).
- There are measures to ensure the monitoring of utilization of genetic resources through checkpoints (although these are not defined and left to national implementation) (Article 17).

In accordance with Australia's ratification of the CBD, in 2002 all State, Territory and Federal governments endorsed the 'Nationally consistent approach for access to and the utilisation of Australia's native genetic and biochemical resources' to promote consistency in the regulation and management of access to 'native genetic and biochemical resources' (Australian Department of Environment [DoE], 2014). This has been gradually implemented by the States and Territories, following the development of Commonwealth regulations in 2005, with further developments likely since Australia has signed the Nagoya Protocol.

The *Environmental Protection and Biodiversity Conservation Act* (EPBC) 1999 specifies ABS requirements, particularly the EPBC Regulations, Part 8A. These regulations apply to Commonwealth land and sea areas including land owned by Commonwealth agencies and departments, land areas leased by the Commonwealth and its agencies (such as areas on Norfolk Island, Kakadu National Park, & Uluru-Kata Tjuta National Park), and the continental shelf, the waters of the exclusive economic zone and the seabed under those waters and the airspace over them (DoE, 2014). The Regulations require a permit for access for R&D purposes in any of these locations. Importantly, there are requirements for prior informed consent where access is sought to indigenous people's land under the regulations: 'If the biological resources to which access is sought are in an area that is indigenous people's land and an access provider for the resources is the owner of the land or a native title holder for the land, the owner or native title holder must give informed consent to a benefit-sharing agreement concerning access to the biological resources' (Article 8A 10(1), EPBC Regs). Prior informed consent and benefit sharing is also required where Indigenous knowledge is used for R&D according to the regulations (Article 8A.08, EPBC Regs).

The Northern Territory has a *Biological Resources Act* (2006) (NT BRA) which is similar in scope and application to the Commonwealth regulations. Under the NT BRA, the 'resource access provider' is based upon land-holders (Government, private, and/or Indigenous), for which there are requirements for prior informed consent and negotiation of a benefit-sharing

agreement with those land-holders (NT BRA S6). The law also requires ‘reasonable benefit-sharing arrangements, including protection for, recognition of and valuing of any indigenous people's knowledge to be used’ (NT BRA S29).

Queensland has also developed a *Biodiscovery Act 2004* which has some differences to the Commonwealth and Northern Territory laws. The law facilitates ABS with regard to biological and genetic resources, but has been criticised for its lack of reference to traditional knowledge of Indigenous people or consideration of Indigenous communities as access providers. As Collings and Evans (2009) note, the law does not explicitly require benefit-sharing as of right with Aboriginal and Torres Strait Islander people, does not provide any recognition for their traditional knowledge, and does not require prior informed consent or mutually agreed terms with relevant Traditional Owners (as Native Title recognised land-holders) and Indigenous knowledge-holders.

The other states do not yet have clear ABS laws, rules and policies, but Western Australia has been developing an ABS regulation for several years. This leaves Australia’s assertions of ‘sovereign rights’ over biological resources and its recognitions of Indigenous rights over these resources and associated knowledge as a rather incomplete legal geography to date. Given that the Nagoya Protocol encourages states to take into consideration the customary laws, community protocols and procedures of Indigenous communities, there is significant scope for improved protections if Australia ratifies the Protocol.

Aside from ABS regulations, Australia does not have any specific protections for Indigenous knowledge. Rather, IP Australia has focused on encouraging Indigenous people and businesses to protect their knowledge, expressions and products through existing IP rights through their ‘Dream Shield’ project. While they provide examples of where Indigenous owned businesses have been able to use copyrights or trademarks to protect their products and expressions (Kelly, 2014), there is still a perceptible gap for the protection of intangible Indigenous knowledge that is not in the form of a ‘business’ product or expression. Rather, this knowledge may be embodied in the traditional uses of a biological resource (typically a plant or animal) and regulated using customary laws and norms. This may require unique or ‘*sui generis*’ forms of protection, particularly through the recognition of customary laws and/or community protocols (see Tobin, 2014). Notably, Australian delegations to the World Intellectual Property Organization (WIPO) Intergovernmental Committee on Intellectual property and Genetic Resources, Traditional Knowledge and Folklore (IGC) have been open-minded and supportive of international development of potential *sui generis* international legal instruments. This suggests that there is recognition of the potential to protect and promote endemic biological resources and Indigenous knowledge in the policy-landscape in Australia, but to date there has not been quite enough political will to close some regulatory gaps and cede some political space to Indigenous peoples.

### **3. PATENT LANDSCAPE METHODS:**

Several papers have been produced which examine the utilization of biological resources in innovations registered and/or protected by a patent (Bubela et al. 2013; Oldham, 2006; Oldham et al. 2013). As Bubela et al (2013: 202) describe ‘a landscape is an analysis of the relationships between multiple sets of indicators measured against temporal, technical or spatial dimensions’ and can be applied to patents, scientific articles clinical trials and other indicators. While they vary greatly in scale and scope, they are being increasingly used to map trends in science and technology. As industries become more knowledge-intensive and

the ‘value-added’ component of their production expands, it is increasingly likely that commercial enterprises will invest in IP protections, including in agri-food, medicines, cosmetics, and related fields that use bush food ingredients. To quantitatively or qualitatively understand the scope of this expansion, patent landscaping analysis offers one of the primary methods. The most comprehensive quantitative studies relating to use of biodiversity have been conducted by Oldham (2006; 2010; et al 2013) at a global level:

...we text mined 11 million patent documents for 6 million Latin species names from the Global Names Index (GNI) established by the Global Biodiversity Information Facility (GBIF) and Encyclopedia of Life (EOL). We identified 76,274 full Latin species names from 23,882 genera in 767,955 patent documents. 25,595 species appeared in the claims section of 136,880 patent documents. This reveals that human innovative activity involving biodiversity in the patent system focuses on approximately 4% of taxonomically described species and between 0.8–1% of predicted global species (Oldham et al, 2013: 1).

Broad-scale patent landscape analyses such as these have important implications for understanding R&D on natural products, with Oldham et al (2013) noting that existing patent activity is focused on a small number of species. They advocate the expansion of R&D on biodiversity, but only in accordance with the CBD rules and Nagoya Protocol, and whilst advocating the exploration of commons and open source approaches to bio-innovation. Now that the Nagoya Protocol has entered into force (in 2014) and many countries have ratified, we are at a critical juncture in time, and it will be important to monitor the effects on R&D, as well as on the ‘providers’ of biological resources and associated Indigenous knowledge. More focused and purposive samples of patents can be used, as we have in this research, to identify areas of activity of interest (i.e. plant species known to have associated Indigenous knowledge).

Given this context, this paper examines recent patent activity (since the early 1990s) relating to plants with known Aboriginal and Torres Strait Islander uses (historical or current). In-depth qualitative analysis of some specific patents focuses in on the most recent patents (since 2000). We have focused on documented native ‘economic plants’ of Australia and ethnobotanically identified plants (Lazarides and Hince, 1993). Keyword searches of the species names were conducted in the main global patent databases and tabulated in a spreadsheet. Notably some, but not all of these plants are endemic to Australia and so a subset of known endemic species was analysed (given the sovereign rights emphasis of the CBD). In addition, there are examples of where the traditional knowledge of uses of individual plants is also not endemic, including several examples whereby knowledge exists in neighbouring regions of the Pacific, South and Southeast Asia or the world (e.g. for *Ageratum conyzoides* known as ‘billygoat weed’ in Australia which seems to have simultaneously derived traditional knowledge of its medicinal uses from different parts of the world). Texts that were utilised as a starting point for the latin species names (and some synonyms of the latin names) that were used in the patent searches included Marrfura et al (1995), Lassak and McCarthy (2011) and Lazarides and Hince (1993).

A non-exhaustive list of 321 plant species used across Australia (particularly tropical/Northern Australia) was compiled, which included medicinal plants, poisons, plants with skin care or other health applications, and food plants. These plants were searched through the main patent databases of the World Intellectual Property Organisation (WIPO) Patent Cooperation Treaty (PCT - Patentscope) for international filings, Espacenet administered by the European Patent Office (EPO), the US Patent and Trademark Office

(USPTO), as well as the patent search engine of IP Australia, to identify existing innovation which is based on Indigenous Australian knowledge, or which might be related to this knowledge. Without access to the High End Computing and linguistics software packages utilised by Oldham et al (2013), this meant manual searches were conducted. This involved laborious visual inspection of patent search results, but allowed greater qualitative analysis and interpretation of the relevance of specific results and ‘hits’ where a patent acknowledged use of Indigenous knowledge.

The article presents basic quantifications of what was identified, with ‘total’ figures derived from the WIPO PCT Patentscope ‘front page’ search (meaning the species is mentioned in the title or abstract and so is a major focus of the patent) which meant obtaining only international filings and national phase allocations totalling 43 million granted patents and applications, but avoiding duplications that would otherwise occur by analysing multiple databases. This data was ‘cleaned’ by noting and cancelling a count when a species was erroneously identified (e.g. the search mixed species and genus names). The other secondary databases were analysed subsequently for secondary or qualitative information, and detected individual country filings in some cases (e.g. a patent naming *Acacia holosericea* was not filed in the PCT but was independently filed in the US). However it is important to note that this search was not exhaustive, and so any quantification is likely to be an under-estimate (if we consider the potential for many ‘missed’ species names) and in some cases an over-estimate (because sometimes species names can be erroneously identified in a patent, or can be listed as one of many ‘potential’ ingredients in very long lists). Rather, the purpose of this study was to identify the presence of activity, whether researchers acknowledge Indigenous Australian uses within the patent documents, to note new R&D activities to compare against the timing of development of ABS regulations in Australia, to qualitatively examine specific patents and innovations of interest (those that appear to have complied or which may not comply with ABS regulations), and then to draw conclusions for ABS and IP policy-making.

## 4. RESULTS:

### 4.1. The Primary International Patent Search

The primary search in WIPO’s Patentscope revealed a total count of 66 species names in the front page (title and abstract) of a patent or application out of 321 species names searched. This means 20% had at least one patent or application. Many of these species name ‘hits’ that were identified had multiple patents and applications filed.

Table 1 provides a list of the top 15 species names identified by number of patents, including columns indicating in how many patents the terms ‘Australia’ showed up in the full text search, plus the known distribution of the species. An additional search for ‘Aborigine/al’ was conducted and only yielded two patents out of this top 15 list, describing cosmetic uses of *Centipeda* species including *cunninghami* and *minima*.

Table 1: Top 15 ‘Patent Hit’ Counts by Species Name with known Indigenous Australian Uses.

Species name	Indigenous or Australian common name	Number of Patents	No. of patents that	Approx. Known
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			<b>mention 'Australia'</b>	<b>distribution</b>
<i>Morinda citrifolia</i>	Ko-on-je-rung, Morinda, Indian Mulberry	314	50	N. Australia, Asia, Pacific
<i>Portulaca oleracea</i>	Munyeroo, Purslane, Pigweed	253	55	Widespread worldwide, weedy
<i>Nelumbo nucifera</i>	Muwulngini, Red lily, Lotus lily, Sacred lotus	200	18	Northern Australia, E. Asia
<i>Nicotiana benthamiana</i>	Tjuntiwari, Muntju	80	257	NW and central Australia
<i>Melia azedarach</i>	Dygal, Dtheerah, Kilvain, White cedar, Cape lilac , Chinaberry	76	8	N. Australia, Asia, Pacific
<i>Centipeda minima</i>	Gukwonderuk, kandjirkalara, kankirralaa Spreading sneezewood	61	2	Africa, Asia, Australia, Pacific
<i>Ocimum sanctum</i>	Sacred basil, Mooda, Bulla-bulla	57	23	N. Australia, Asia, Malesia
<i>Brucea javanica</i>	Brucea fruit, Macassar Kernels	43	4	N. Australia, Asia, Malesia
<i>Asparagus racemosus</i>	Asparagus Fern, Native Asparagus	30	13	N. Australia, Asia, Malesia
<i>Pongamia pinnata</i>	Napum-napum, Karum, Indian beech	30	23	N. Australia, Asia, Malesia
<i>Wikstroemia indica</i>	Bootlace Plant, Settler's Bootlace, Tie Bark, Tie Bush	28	0	N. Australia, Asia, Malesia, Pacific
<i>Boerhavia diffusa</i>	Common Spiderling, Giotcho, Hogweed, Tah Vine, Tar Vine	27	5	Worldwide tropics
<i>Euphorbia hirta</i>	Queensland asthma plant, Snake weed	24	59	Worldwide tropical and subtropical
<i>Nicotiana excelsior</i>	Giant Tobacco, Shiny-leaved Native Tobacco	20	26	Central Australia
<i>Calophyllum inophyllum</i>	Alexandrian Laurel, Beach Callophyllum, Indian Doomba Oil tree	17	10	N. Aust, widely in tropics, West Africa, Pacific.

Source: WIPO Patentscope (<http://patentscope.wipo.int/search/en/result.jsf>) analysis of 'front page' and 'full text' conducted by the author and colleagues. Distribution, common and Indigenous names from multiple sources including Atlas of Living Australia, CABI (<http://www.cabi.org/isc>) and Australian Tropical Rainforest Plants (TRIN) 6<sup>th</sup> edition.

These hundreds of hits suggest that in many cases biological resources sourced from Australia may have been used in a patent. But, given the wide distribution of many of the species identified, either within the Asia Pacific regions or globally, it is difficult to ascertain

if Australian biological resources have been used in the R&D towards the claimed ‘inventions’ or discoveries in the patents and applications. The number of mentions of ‘Australia’ again gives only a weak guide to the possible sourcing of biological resources from the country, with many of these patents listing Australia as one of many possible sources of the biological resources. Under the PCT and other international patent laws there is no requirement to disclose the source or origin of the genetic resources used in R&D leading to a patent, although many countries have started to adopt this practice.

A high prevalence of traditional Chinese medicines (TCM) was noted in the search, in some cases seeming to have similarity or overlap with Indigenous Australian knowledge, Indian knowledge or other traditional knowledge from adjoining regions in Asia or the Pacific. Most commonly these patent applications were made by Chinese and Indian researchers or institutions. Examples included patents on *Asparagus racemosus*, *Boerhavia diffusa*, *Calophyllum inophyllum* and *Callitris intratropica*, *Cleome viscosa*, *Clerodendrum inerme*, *Evolvulus alsinoides* and others. To explain in more detail, Indigenous Australian’s using *Clerodendrum inerme* or ‘Ta-anji’ (Batavia River Community) are reported to have ‘rubbed crushed leaves on sores’ and similarly there are several hair and skin care related patents from Japanese and Chinese applicants. A probable explanation for this is that the plant is also found in these countries either natively, through trade or transfer, and traditional medicines may have developed concurrently for similar medicinal purposes, or the knowledge may have been transferred concurrent with trade. However, there are also possibilities of more recent transfers within the modern era of ‘intellectual property rights.’

Of the commonly patented plant species listed in the table, two: *Nicotiana benthamiana* and *Nicotiana excelsior* are endemic to Australia, and so the biological resources used for the R&D behind these patents is much more likely to have been sourced from Australia, and the origins of the plants are certain, which has relevance from the ‘sovereign rights’ orientation of the CBD. Notably, none of the 80 or more patents describing uses of the two *Nicotiana* species appear to acknowledge traditional uses of the plants, despite the potential for Indigenous knowledge to have been used as a lead towards these inventions.<sup>1</sup> The two related *Centipeda cunninghami* and *Centipeda minima* patent filings acknowledge Indigenous Australian knowledge of the plant’s uses, implying that it was a lead towards the R&D discovery for the ‘therapeutic composition and method for treating skin’ (US Patent No. 5,804,206). These are analysed further in the discussion.

#### **4.2. Patent Analysis of Endemic Species Use:**

To further explore the potential use of Indigenous Australian knowledge in patents, this project examined patent activity on several other species of bush food or medicine thought to be *endemic* to Australia chosen from the list of 321 species. Aside from the *Nicotiana* species noted above, patents were identified against seven more plant species with known Indigenous Australian uses which, to the best of our knowledge, are endemic to Australia. Table 2 indicates the species and common names, patent details and some Indigenous uses of the species.

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<sup>1</sup> Here we have said ‘80 or more’ because it was noted that there were several patents which mention both *Nicotiana* species.

Table 2: Endemic Australian Species and Associated Patents.

Species Name	Indigenous and Common names	Indigenous Australian uses	Relevant Patents <sup>2</sup>	Details of Patents
Alphitonia excelsa	Red Ash, Soap tree	Used to apply leaves to sore eyes. An infusion of the leaves in warm water was used for bathing in cases of headache, and an infusion of the bark, root and wood as rubbed on the body as a liniment for body pains. A bark and wood decoction was used as a gargle for toothache, it was drunk as a tonic. Young leaf tips were chewed for an upset stomach.	US 8,173,184 (filed 14/8/2009, issued 05/08/2012) Assigned to Mary Kay Inc.	Topical skin care formulations comprising botanical extracts (species noted in abstract)
Davidsonia pruriens	Orray, Davidson's Plum	The fruit is eaten and may have been used as an anti-bacterial.	23 patents found, only making superficial mentions of the species	All make minor mention for use as a potential ingredient in various cosmetic/topical products and colour markers.
Dodonaea lanceolata	Hopbush	Western Australian Aborigines used to apply the bruised, cut up and boiled leaves, after slightly cooling them, to various parts of the body for the relief of pain, including snakebite. A very much more diluted decoction of the leaves may be drunk for the	WIPO Publication number: WO/2011/057332 Int. filing date: 10/11/2010 Assigned to UniSA and Chuulangun Aboriginal Corp.	Anti-inflammatory compounds. Abstract cites <i>Dodonaea polyandra</i> and description mentions isolates of <i>Dodonaea</i> species.

<sup>2</sup> Some identified patents have been excluded because they make a minimal or substitutable reference to the species name, for example *Alphitonia excelsa* in WIPO Publication Number WO 2003011891 (filed 2001, published 2003) (CSIR India); and *Geijera parviflora* in WIPO Publication number WO/2006/042441. These may nevertheless use endemic biological resources sourced from Australia.

		same complaints; at the same time leaves were tied under the belt to enhance the curative effect.		
Eremophila alternifolia	Emu bush, Scented Emu Bush, Narrow-leaved Emu Bush	Patent notes 'it was used internally and externally as a decongestant, expectorant and analgesic. It was reported that this treatment alleviated colds, influenza, fever and headaches and was used for septic wounds, inducing sleep and general well-being.'	WIPO Publication No. WO/1996/010408 Assigned to the 'Executive Director of the Western Australian Department of Conservation and Land Management'	Cardioactive compounds isolated from woody perennials (especially Eremophila species). Extensive Aboriginal uses noted in patent description. The patent indicates benefit-sharing.
Eremophila longifolia	Berrigan, Emu bush, Dogwood	Patent notes: 'It is a traditional Aboriginal medicinal plant used by Aborigines externally for sores and internally as a cure for colds.' Used as a 'smoke treatment' for mothers and new babies.	International app. filing no. PCT/EP2010/062774, to Patrick Prendergast (Australian), filed 31/08/2010.	Anti-bacterial compositions comprising extracts of eremophila longifolia and methods for use of same
Eremophila maculata	Emu Bush, Wedgerra, Tchuldani, Pitula	The Aborigines of the Hungerford district used the leaves as a blister when suffering from a cold. Parts of Eremophila spp. used in ceremonial rites, extracts and decoctions of plant parts have been used as liniments, medicines and antiseptics.	JP2009197035, filed 03/09/2009 (in Japanese only, found on EPO).	External Preparation for the skin. Several Eremophila species mentioned.
Terminalia ferdinandiana	Gubinge, Billy goat plum, Kakadu Plum	High energy food. May have had some medicinal uses (bark used to treat sores, boils, ringworm and leprosy).	19 patents and applications. Several related patents assigned to Mary Kay Inc., including US patent 8,691,300 (filed on 30/8/2010, granted on 8/4/2014).	Patents mainly for skin care products.

Sources: WIPO registered patents in Patentscope: <http://patentscope.wipo.int/search/en/search.jsf> accessed 8/12/14). US Patent status – USPTO Public PAIR portal <http://portal.uspto.gov/pair/PublicPair> (accessed 5-6/12/14). JP2009197035 found at EPO: <http://worldwide.espacenet.com> (accessed 8/12/2014). Lazarides & Hince (1993), Lassak and McCarthy (2011) and Marrfurra et al (1995), Smith (1993) and Wightman et al. (1991) for Indigenous Australian uses. Richmond (1993) and Williams (2013) for *Eremophila* species. Gorman et al (2006) and Woods (1995) for *Terminalia ferdinandiana*.

The identification of dozens of patents which utilise endemic Australian biological resources is of a significant ‘biopiracy’ concern. While two patents on *Dodonaea lanceolata* and *Eremophila alternifolia* have clearly sought consent from and involved Indigenous Australians (the former) and indicated intent for ‘fair and reasonable’ benefit-sharing (the latter) as required by the CBD, we did not detect any indication of either prior informed consent or benefit-sharing in other patent documents analysed. As we discuss below, this is of concern because it may represent a breach of Indigenous customary laws, may cause cultural offence, may be a lost economic opportunity to provide remote Indigenous employment and benefits to communities, and because it may also undermine Australian sovereign rights and breach Australian biodiversity laws. Further, the original intent of ABS in the CBD was as a funding mechanism and ‘equity’ tool towards conservation and sustainable use of biodiversity, so there is a potential loss of ‘green economy’ type funding.

## 5. QUALITATIVE ANALYSIS AND DISCUSSION:

To contextualise, we examine in more detail some of the patents and applications over Australian, particularly endemic, biological resources which have been used by Indigenous Australians.

*Nicotiana excelsior* has been described as having Indigenous uses as a ‘narcotic, mixed with ash and chewed’ (Lazarides and Hince, 1993) much like other *Nicotiana* (tobacco) plants can be used. Several of the patents relate to use of *Nicotiana excelsior* and/or *Nicotiana benthamiana* for use in hybridised plant breeding to increase the biomass of tobacco plants. In addition a ‘smokeless tobacco’ invention is patented as US Patent 20110005536 on ‘*Nicotiana* Diversity’ and claiming a composition for smokeless tobacco from 65 *Nicotiana* species. This sort of ‘species-wide’ and in this case genus-wide patenting has been described as biopiracy, with other broad-claim patents having been challenged and revoked by the courts. For an example see Robinson (2010, p72) on Monsanto’s species wide GM soya patent (EP0301749) which was revoked in the EU after being challenged by an NGO in 2007. The implications of patenting across a whole genus are substantial – it is a private right across plant genetic resources that ‘sovereign rights’ implies are a public good (and which earlier international negotiations asserted as ‘common heritage of humankind’). Depending upon how strictly the patent-holder asserts their patent rights, the implications for other plant breeders and users could be dramatic on their ‘freedom to operate’ for related uses.

*Centipeda cunninghamii* is near endemic, being only found in Australia and New Zealand, and so its origins if not its source is one of the two countries. The patent (US Patent No. 5,804,206) was applied for in 1997 and granted in 1998 in the US to US-based company ‘Bio-Botanica, Inc’ (USPTO, 05/12/2014), which is after the entry into force of the CBD.

The company's website indicates the sale of the trademarked product 'Phytoplentin' containing extract of the species is for sale in the US and Australia. No-where on the website does the company indicate if benefit-sharing with Indigenous Australian's has occurred, although it does mention the traditional use of *Centipeda cunninghami* (Bio Botanica, 2014). At the time of application and grant of patents, Australian state, territory and federal governments did not have ABS laws in place. However there are another 10 'hits' on the use of this plant in a full text search of the USPTO, suggesting researchers may have more recently sourced and used the plant after Australian laws entered into force. Of particular relevance, Bio Botanica have another patent citing the 'anti-inflammatory and cell renewing properties' of *Centipeda cunninghami* for a 'method and composition for treating oral bacteria and inflammation' which was filed in 2004 and granted in 2010 (USPTO, 05/12/2014; Patent Number 7,829,067), which is after entry into force of a number of Australian ABS laws, suggesting permissions from providers and benefit-sharing may have been required depending upon where the plant was acquired.

Aside from explicit state law requirements, there are customary laws and rules of Indigenous Australians which often exist surrounding the uses of plants. In addition, there have been ethical expectations surrounding the ethnobotanical field since the 1980s. The Code of Ethics from the International Society of Ethnobiology (ISE) was initialled in 1996 and officially adopted by the Society of Ethnobiology board in 2006. The ISE Code of Ethics has its origins in the Declaration of Belém, agreed upon in 1988 at the founding of the International Society of Ethnobiology (in Belém, Brazil) (ISE, 2006).

According to the claims and descriptions of the patents on *Eremophila longifolia* and *maculata* there is the strong possibility that these are based on Indigenous Australian knowledge. One patent – assigned to 'Patrick Prendergast' is recorded as the Australian inventor. Without further information, we do not know if he is an Indigenous knowledge holder, or someone who has used Indigenous knowledge as a lead towards the claimed invention (with or without benefit sharing and prior informed consent). Even if he were an Indigenous knowledge-holder, ethical questions can be raised about sole-ownership of a patent that appears to be based on Indigenous knowledge that is held by many individuals and communities about the uses of the tree. *Eremophila longifolia* is known to have considerable ritual significance for Indigenous Australian people, according to Williams (2012 p317, citing Latz, and Green, 1995) 'it could be said to be the most sacred, mystical or magical of all Central Australian plants.' This highlights the additional potential for breach of customary laws and cultural affront if prior informed consent has not been obtained for use of, and private monopoly rights over, this plant and the associated knowledge.

The fact that the *Eremophila longifolia* patent cites Indigenous Australian uses suggests that this may be a 'discovery' type invention that builds-upon or chemically 'validates' existing Indigenous knowledge, making a strong case for benefit-sharing. From a legal standpoint, the likely source is Western Australia where there are some limited requirements for access permissions in certain areas and under certain conditions. For example, under the *Conservation and Land Management Act 1984* there are permit requirements for access to forests on Crown Lands under s88 of the law, which may be relevant in this case. The Western Australian government has purportedly been developing more explicit ABS regulations that would also include provisions relating to Indigenous knowledge. From an ethical standpoint, there seems a strong case here that prior informed consent and benefit-sharing should be established with Indigenous knowledge providers.

The *Eremophila maculata* patent raises almost identical questions to the previous *Eremophila* patent, except that the patent-holder is a Japanese company (Tsuji Chemical Corp), raising the question of whether a permit was obtained to extract samples from the endemic trees to conduct the R&D overseas towards the patent. The patent is mainly in Japanese, but from the basic information provided it is clearly for a composition containing extracts from several *Eremophila* species for a skin care/cosmetic cream (EPO, 8/12/2014). Given the similarity between the patent description uses and the Indigenous uses of extracts of *Eremophila* species as a 'liniment' and 'antiseptic' there is a possibility that this patent is essentially derived from Indigenous knowledge.

In the case of the *Alphitonia excelsa* patent assigned to Mary Kay Inc. the Indigenous knowledge that we identified did not directly match up with the patent claims. But the patent does list several plant species, including endemic species, and even acknowledges the Australian origin of the plants in the patent document. The patent is for a topical skin care product based on extracts of several plants – in a similar previous patent application in Australia this company had difficulty proving novelty and inventiveness for similar claims for a botanical mixture type skin care product (relating to *Terminalia ferdinandiana* or Kakadu Plum) as discussed below.

Although patents on *Terminalia ferdinandiana* have been identified and analysed in previous articles (see Morse, 2011; Holcombe and Janke, 2012) there have been some recent updates relating to the plant, including the new US patent: 8,691,300. To re-cap, a previously filed similar patent application (WO/2007/084998, Filed 19 January 2007) assigned to Mary Kay Inc. noting the use of Kakadu Plum and Acai berry extracts for a skin care purpose had its claims rejected by IP Australia on the grounds of lack of novelty and obviousness. The company then withdrew this application from IP Australia. But the case raised important questions about Australian biological resources, 'sovereign rights', the enforcement of ABS, and how to ensure Indigenous Australian's are beneficiaries. While it was initially unclear where the biological resource had been obtained, in an interview with SBS World News Radio in 2011, Crayton Webb of Mary Kay Inc. admitted that they had ethically obtained Kakadu Plum from a supplier in the Northern Territory, under a license issued by the Australian Government (Atkinson, 2011). However, there does not appear to be any such license listed in the Australian Government Department of Environment's website, suggesting that access for general commodity trade is being confused or misunderstood against access for R&D.<sup>3</sup>

Given the attempt to obtain a patent, the company is making a de facto claim to have undertaken innovation through R&D – the trigger for ABS. To contextualize, the Kakadu Plum is endemic to northern Australia, found mainly in the Northern Territory, the far north of Western Australia, and also to a limited extent in far north Queensland. As noted earlier, these states have ABS laws and regulations, typically requiring permits and a contract of mutually agreed terms to be established with the 'provider' of the biological resources, such that they receive some benefits. The supplier has not yet been publicly named and so it is not possible to determine if indigenous people are involved in supply of the plum, or if there is substantial employment and income benefits. Without an ABS agreement, it seems there are no other benefits likely.

The Gundjeihmi Aboriginal Corporation, which represents the Mirarr, said people in the area had used the plum longer than anyone could remember: "The Kakadu plum has been an

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<sup>3</sup> Similarly, the NT Government was contacted in 2010 and did not have a record of a licence to Mary Kay company for access.

important source of food and medicine for the Mirarr. It also features in oral histories and 'dreaming' stories" (Powell and Murdoch, 2010). Geoff Kyle of the Gundjeihmi Aboriginal Corporation indicated that the Mirrar were not necessarily seeking benefits, but rather were keen to be informed and consulted about such activities (Atkinson, 2011). Several similar statements were issued by Aboriginal organisations and the Northern Land Council.

The recently granted (8 April 2014) US Patent number 8,691,300, is a substantially similar patent to the application filed with IP Australia and which had its claims rejected. The patent even cites some of the articles written about the Australian filing which are critical of it, and which were used as evidence of prior art in a pre-examination submission filed in Australia in 2010. The description of the US patent is expanded, and includes what seems to be an acknowledgement of the source of the ingredients used in the patent: 'Terminalia ferdinandiana (kakadu plum) fruit extract... can be purchased from Southern Cross Botanicals Pty Ltd (NSW, Australia) which was used in the Examples' (USPTO, 10/10/2014). This appears to contradict what was said by a company spokesman in 2011. Following media reports about the Australian patent filing in 2010, it seems possible that this element has been added to the patent in circumvention of Australian ABS regulations, since NSW has failed to publish a regulation or policy on ABS to date (DoE, 8/12/14). As a result, these gaps in the national ABS framework could inadvertently be causing lost opportunities for the States and Territories that do have laws in place, as well as the Indigenous Australian's that could benefit from them. If companies can literally hop across a border (Southern Cross Botanicals is located near Byron Bay in Northern NSW; Queensland has a Biodiscovery law, but NSW does not) to avoid seeking prior informed consent and establishing benefit-sharing, then greater 'National Consistency' is needed in the Australian ABS framework.

Another patent assigned to Mary Kay Inc. cites Kakadu plum in the abstract (US Patent Number 8,178,106) as well as several other known dermatologically active botanical ingredients (camu camu and argan) that have already been the subject of several patents, disputes and 'biopiracy' claims, raising further questions about the ethics and legality of the patent claims and use of biological resources being made by this company. With the Nagoya Protocol negotiated for several years and only just coming into force in 2014, several botanical medicines, cosmetics and related companies seem to be racing for 'accumulation by dispossession' (Prudham, 2007) before governments can close these sorts of loopholes in their ABS frameworks.

## **6. CONCLUSIONS:**

Given the high level of endemism of plants and animals in Australia, and the rich and widespread Indigenous knowledge of their potential uses, it seems clear that Australia could benefit from a more nationally consistent ABS regulatory framework. Currently, gaps remain in the framework, and there are still few states and territories that effectively assert Indigenous rights over their knowledge and the associated biological resources that Indigenous Australians have used for millennia. The patents examined in this article highlight that potential ethical, customary and cultural affront may be caused by the use of Indigenous knowledge without prior informed consent, and that there are lost benefits for these communities and for Australian resource providers (e.g. land-holders, government agencies) including as a potential source of conservation funding.



The results note the possibilities of Aboriginal Corporations, organisations or communities filing for patents as joint owners and/or joint inventors as per patent WO/2011/057332 jointly filed by Chuulangun Aboriginal Corporation and the University of South Australia, and others jointly filed by Jarlmadangah Burru Aboriginal Corporation and Griffith University (see Holcombe and Janke, 2012). However, the limited duration (20 years) and the exclusive nature of a patent, and the requirements of novelty and obviousness for patentability will often make them a poor candidate for protection of Indigenous knowledge (often orally shared, communally and customarily regulated, held by various knowledge holders, associated with culture, rituals and practice). While projects such as Dream Shield by IP Australia may assist Indigenous businesses, further protections would be beneficial including *sui generis* protections that recognise customary laws and community protocols, as well as a mechanism for protection of widely shared Indigenous knowledge (e.g. a common fund for benefit sharing). In addition, there was a high level of ambiguity about the source and origins of biological resources and associated Indigenous knowledge (with only a few exceptions) in the patent documents searched. This gives further credence to the suggestion by Oldham (2013) and others that an international ‘disclosure of origin’ patent requirement would provide an important checkpoint to ensure that ABS rules have been followed, PIC is sought and appropriate beneficiaries are identified. The appropriation of this knowledge as well as the use of biological materials in patents has also raised calls for alternative approaches to support R&D on biologicals such as open source and common pool approaches, that are non-exclusive (Oldham, 2013; Drahos, 2014; Palombi, 2009). These could be designed so as to still require prior informed consent for use of Indigenous knowledge, and benefit sharing where appropriate (i.e. if a common pool utilised product is successfully commercialised).

While it is not clear for all the patents identified here if Indigenous knowledge has been used, it seems highly likely that it was used as a lead in several cases. The failure of these patents to recognise and seek permissions for use of Indigenous knowledge is akin to past colonisations. As Dutfield (2004, pp58-9) explains this process assumes a *res nullius* (the property of nobody) treatment of territories, ecosystems, plant species and Indigenous knowledge before their ‘discovery’ by explorers, scientists, corporations or governments. By ignoring the customary laws, rules, rituals and beliefs of Indigenous Australians, as well as the national ABS framework, these researchers and companies appear to be breaching or side-stepping Australian laws at multiple scales and in multiple forms of jurisprudence. The Nagoya Protocol puts forward a new agenda for countries to improve protections of Indigenous knowledge – it encourages states to recognise relevant customary laws and encourages them to develop community protocols. The use of protocols may help to document and identify a community’s customary laws, beliefs and interests, which might otherwise remain unknown to researchers (see Bavikatte and Jonas, 2009). These actions surely provide a step towards the prevention of further inequities, misappropriations and biopiracy.

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