# A Review of Phytochemicals and Bioactive Properties in the Proteaceae family

**Naveen Sharma, Kirti *, Jyoti Gupta**

**Address: IEC University, IEC School of Pharmacy, Baddi, Solan,**

**H.P. Pin code -174103**

**Abstract:**

Due to unhealthful current dietary habits including the intake of foods heavy in sugar and fat, natural plant-based foods have been employed more and more in recent decades to promote human health. Aboriginal people have exploited several native animals for food and medicine. It is crucial to comprehend the health-promoting bioactive profile of native Australian plants. The horticultural and food industries have made commercial use of members of the Proteaceae family, including the genera of Protea, Macadamia, and Grevillea. Certain discoveries about the Persoonia species, a genus belonging to the Proteaceae family, have been documented by researchers. This review's objective was to present an overview of the genus Persoonia and the family Proteaceae, including topics such as distribution, phytochemicals, traditional and commercial usage, bioactive qualities, possible benefits, and difficulties. The present research examined bioactive chemicals and their characteristics associated with the health benefits of the Proteaceae family, specifically the Persoonia genus, with a view to exploring their possible uses in the food business.

**Keywords**: Proteaceae; indigenous fruits; phytochemicals; bioactive properties; functional ingredients

---

**Introduction:**

Fruits and vegetables are rich in antioxidant components, such as tocopherols, phenolics, carotenoids, and anthocyanins [1]. Roughly 20% of all plants have been studied for their potential medicinal uses, which have improved healthcare by curing cancer and other dangerous disorders [2]. Numerous different types of bioactive chemicals can be produced by plants. Fruits and vegetables store large amounts of phytochemicals that may shield against harm from free radicals [3]. Beneficial phytochemical-containing plants can serve as natural antioxidants, enhancing the body's requirements [4]. Numerous plants are rich sources of antioxidants, according to numerous research. For example, flavonoids, tannins, and chemicals present in plants—as well as vitamins A, C, and E all function as antioxidants [3]. Because of their high nutritional content and therapeutic qualities, eating fruits and vegetables has been associated with a number of health advantages [5]. By preventing or postponing the oxidation of food items brought on by reactive oxygen species (ROS), antioxidants manage and minimize oxidative lignins—phenolic damage to food products, thereby extending their shelf life and improving their quality [6]. Ascorbic acid, beta-carotene, and many phenolics all have important functions in lowering inflammation, postponing the aging process, and averting some types of cancer [7]. Many organizations and health care systems worldwide have advised people to increase their intake of fruits and vegetables [8]. People have been looking to nature for medicines to treat their illnesses since ancient times. The first people to use therapeutic herbs did so out of instinct, just like animals do. The use of medicinal plants to cure sickness shifted away from an empirical foundation as it became apparent over time why people were turning to different plants for the treatment of different illnesses [9]. The herbal medicine market was valued at 170 billion USD in 2022. Projections show that this market will grow to 600 billion USD by 2033, with a 15% compound annual growth rate (CAGR) from 2023 to 2033.[10] . Pharmaceutical companies worldwide that are searching for novel treatments can benefit greatly from the use of natural products in medicine [11]. It's estimated that Bangladesh is home to about 6,500 different plant species, of which more than 500 are known to have therapeutic qualities, and of which 250 are regularly used to make medicines. To determine whether portions of these plants are valuable, however, the majority are not being studied chemically, pharmacologically, or toxicologically [12]. Throughout

history, mangroves and their derivatives have been utilized extensively for both non-therapeutic and medicinal uses worldwide. Reports have indicated that plant extracts originating from mangroves exhibit demonstrated efficacy against diseases that affect humans, animals, and plants [13]. The unusual conditions these plants live in—high moisture, significant tidal fluctuations, high salt, etc.—may be the cause of their diversity in activity. Under these harsh circumstances, these plants may alter their morphology, physiognomy, and biochemical pathways in order to survive [5]. Bangladesh is home to the world's biggest single block of Sundarbans mangrove forests, an ecosystem rich in plant species that is globally significant [13]. Polygonum minus (P. minus), a member of the Polygonaceae family, is frequently referred to as kesum in Malay and pigmy knot weed in English[14]. Because of its pleasant and fragrant scent, this plant is frequently used as a flavoring in the making of laksa, ulam (salad), and other delicious Malay dishes. Southeast Asian nations include Malaysia, Indonesia, Thailand (Phak pai), and Vietnam are home to the plant. The plant yields essential oil that has a high concentration of aliphatic aldehydes (72.54%)[15], and the Malaysian government has identified it as a crop capable of generating essential oil in the Herbal Product Blueprint[16]. The plant grows naturally, particularly in moist places like side ditches or the vicinity of rivers and lakes. P. minus is a low-growing shrub that reaches a maximum height of 1.0 m in lowlands and 1.5 m in highlands. It is thin and creeps. The leaves are dark green, fragrant, lanceolate, and 5-7 cm long by 0.5-2.0 cm wide (Figure 1). They are placed alternately on the stalk. The cylindrical stem has short internodes, nodal segments of simple roots, and a dark green tint with hints of reddish color[17]. Apical inflorescence is present, with lenticular black or dark brown-colored fruits and tiny, 1.5–2.0 mm long, white or purple-colored flowersDespite being a common ingredient in Malayse cuisine as an appetizer and flavoring for food, P. minus has historically been utilized in herbal medicine as a treatment for dandruff and stomach issues in Malaysia. Aromatherapy[18] and the perfume industry[17] both employ the essential oil that is extracted from P. minus leaves, which is applied to hair to eliminate dandruff. Numerous pharmacological characteristics of P. minus have also been identified, including antibacterial activity [19], cytotoxic action against HeLa (human cervical carcinoma) [20], antioxidant activity [21], and anticancer activity [22,23].

**Phytochemicals**:

Research on the phytochemical properties of natural plants is opening up new avenues for drug discovery, which is crucial for meeting medical needs and identifying possible therapeutic benefits for human health. Primary and secondary metabolites are the two forms of organic molecules that plants can make; secondary metabolites are generated from primary metabolites and are intermediate or produced in pathways of stress response simulation [24]. Over the past two decades, there has been a significant growth in scholarly interest in phytochemicals, despite the incomplete understanding of the mechanisms underlying secondary metabolites [25]. Phytochemical studies are useful for drug discovery and development in a variety of industries, including food (dairy products, additives, colors, or spices), horticulture (pesticides or nutrient additions), pharmaceuticals (drugs, poisons, or stimulants), and manufacturing (fuels or coloring additives). Phytochemicals can be broadly categorized into six groups, which include lipids, carbohydrates, alkaloids, quinones, phenolic compounds, and terpenoids [70]. These groups of molecules have benefits for human health in addition to being crucial for plant growth.
At now, phytochemical profiling has been conducted on only 30% of Proteaceae species, with less than 10% of these species having had their chemicals isolated and purified. The most often used and studied genera are Grevillea and Protea [26]. having been documented in earlier research as 362 species in Grevillea and 112 species in Protea . Proteaceae is a family of less than 400 known substances, divided into three major groups: alkaloids (13%)[ 27,28], quinones (8%), and phenolic compounds (69%). Given the high concentration of phenols and polyphenols in the Proteaceae family, these species have a wide range of possible bioactive characteristics, including antiviral, antibacterial, anti-inflammatory, antioxidant, and antiallergic effects. Within the family Proteaceae, the three largest classes of phytochemicals are phenolic glucosides, alkylresorcinols and their derivatives, and tropane alkaloids [27] From 15 to 39 (Icariside B1, Kaur-16-ene, and Farnesylacetone)—compounds not found in the previously examined studies [27,28]—only the newly identified phytochemicals from the earlier studies were included till 2023

**Bioactive properties:**

Fruits are a valuable source of nutrients and dietary energy, as they offer fiber, minerals, vitamins, and phytochemicals. Their nutritional and health benefits have led to their consumption. Numerous fruits have demonstrated potential protective properties against several diseases, including cancer, obesity, chronic illnesses, eye diseases, and cardiovascular diseases [29,30]. Approximately 25,000 plants have been identified in Australia as of right now, 2000 of which are edible and some of which are transported outside [31]. Australian native fruits grow seasonally and are

readily available in both arid and non-arid areas of the country [32]. which can meet clients' needs all year long. A number of native fruits, including quandong, riberry, pepper berries, lemon aspen, Davidson's plum, Kakadu plum, and bush tomato, have become popular in Australia and gained economic traction. The difficulty of commercializing and satisfying both domestic and foreign market demands has caused the Australian native food business to grow slowly [33]. On the other hand, these plants offer a potentially valuable supply of consumable fruits that possess bioactive qualities like anti-inflammatory, antidiabetic, antioxidant, and antibacterial effects [34].

**Antioxidant Activity:**

The oxidative stress caused by imbalances between antioxidants and free radicals in the human body may be the cause of various ailments, aging, cancer, and respiratory illnesses [35]. Numerous free radicals, such as hydroxyl, superoxide, nitric oxide, hydroperoxyl, nitrogen dioxide, and lipid peroxyl radicals, that are created when cells metabolize oxygen might cause this imbalance [36]. Antioxidant absorption, however, can lessen the amount of free radicals in the body to ward against illness. Therefore, it is helpful to determine the antioxidant activity of plants and their derived (food) products. The techniques for measuring antioxidant activity have advanced significantly in the last several years. Using spectrometry, the evaluation of antioxidant activity is mostly split into two categories: single electron transfer (SET) and hydrogen atom transfer (HAT) tests, with the exception of chromatographical and electrochemical approaches (Figure 1). While the mechanism of SET measures the ability of antioxidants to reduce metals, carbonyls, and radicals by donation of an electron, the mechanism of HAT measures the ability of antioxidants to donate hydrogen to free radicals [36]. The oxygen radical absorbance capacity (ORAC), the total peroxyl radical-trapping antioxidant parameter (TRAP), and the total oxyradical scavenging capacity (TOSC) assays are typical methods of HAT assays. On the other hand, common examples of SET assays are the ferric reducing antioxidant power (FRAP), the cupric antioxidant capacity (CUPRACA), and the total phenolic content (TPC) using Folin-Ciocalteu reagent [35]. Trolox equivalent antioxidant capacity (TEAC) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging capacity assay are two further coupled mechanisms of SET and HAT [92]. Although lipophilic substances cannot be detected by TPC, FRAP, or DPPH, these techniques are currently routinely used to assess the antioxidant activity of plants [35,36]. It is advised, based on Chaves's research, to take into account at least two distinct approaches when measuring antioxidant activity during the study[37].

**Antimicrobial Activity:**

Human health is compromised by food borne bacteria, which may result in various ailments. Bacillus, Salmonella, Campylobacter, Escherichia, Staphylococcus, and Listeria spp. are among the common foodborne pathogens mentioned by the New South Wales Food Authority [38]. For instance, between 0.5 to 8 hours, individuals with a Staphylococcus aureus infection may experience symptoms such as vomiting and stomach pains. In addition, the discovery of antibiotics helps treat human ailments, but it also causes microbes to develop drug resistance. Finding novel antibiotic compounds is therefore a key goal for developing new medications. Numerous research investigations have demonstrated that a variety of chemicals found in natural sources may have antibacterial capabilities, such Terminalia carpentariae [39], Terminalia ferdinandiana [40], Acacia floribunda [41]Macadamia integriflora [42], and Hakea sericea [43]. Antimicrobial activity may now be tested using a number of standardized techniques, the most often used of which are the dilution and diffusion tests [44]. Other techniques include the time-kill test, flow cytofluorometric method, ATP bioluminescence assay, diffusion assay, and bioautography. This is mostly due to the fact that approaches other than the diffusion and dilution tests call for specialized tools and more intricate statistical analysis. The official and recognized methods for testing antimicrobial susceptibility are the agar disk and the well diffusion method [44]. Nevertheless, both methods are unable to differentiate between bacteriostatic and bactericidal effects. Consequently, the least concentration of antimicrobial medications required to detectably impede the development of microorganisms—also known as the minimum inhibitory concentration (MIC)—can be ascertained by dilution procedures, a quantitative measuring technique. The lowest concentration of antimicrobial agents that kill 99% of bacteria may be found using the minimum bactericidal and fungicidal concentration (MBC/MFC) method. Certain dye reagents, such as 2,3,5-triphenyltetrazolium chloride (TTC) [45], resazurin [46], and 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide (MTT) [44], have been studied as indicators to improve the accuracy of visual findings.

In bioactive investigations of the Proteaceae family, three genera of particular relevance are Protea, Grevillea, and Hakea. When comparing the Proteaceae plant research to other assays, antimicrobial activity was the most highly measured. The Proteaceae family of bacteria is mostly investigated using five microbes: E. Col (20 studies), S. aureus (19), P. aeruginosa (11), C. albicans (9), and B. cereus (9). M. integrifolia fruit has been tested against E. coli, showing

the maximum microbiological activity at a MIC of 5.3 µg/mL [42], In contrast to the >100 µg/mL MIC value in the stem of Roupala brasiliensis [47], the leaves of Embothrium coccineum [48], the bark of Darlingia darlingiana [49], and other species, the MIC value in our study is 31.125 ± 0.2 µg/mL. The stem of Roupala brasiliensis exhibited the highest level of antimicrobial activity in S. aureus investigations, with a MIC value of 15.6 µg/mL [50]. Meanwhile, G. avellana aerial tissues shown antibacterial activity against P. aeruginosa, with a MIC value of 64 µg/mL [51]. Comparing M. integriflora (leaf) to prior investigations on C. albicans and B. cereus, the leaf showed the highest MIC values, at 6.5 µg/mL and 5.8 µg/mL, respectively [42].

**Cytotoxicity:**

One of the most important health issues in the world today is cancer. The World Health Organization (WHO) reported that the number of cancer-related fatalities increased from around 4 million in 2014 to 10 million in 2018 [52]. Furthermore, it was estimated that over 60% of natural products, or more than 3000 plants, were the source of anticancer medications with additional value [53]. As a result, curiosity for the identification of anticancer drugs has grown. An in vitro investigation called cytotoxicity research is used to examine how medicinal drugs affect the growth, destruction, and reproduction of cells. These days, the four primary cytotoxicity tests that are often employed are luminometric, colorimetric, fluorometric, and dye exclusion[54]. Among the colorimetric cell proliferation tests, the methyl thiazolyl tetrazolium (MTT) assay is the most often used in research. Nevertheless, application issues arise from the MTT assay's excessive sensitivity. As an instance, kaempferol and (-)-epigallocatechin-3-gallate may lower the MTT to formazan, influencing the outcomes [55].

The cytotoxic study of the Proteaceae species included a variety of tests, such as trypan blue dye [56]. The assays are as follows: MTT [57,58,59,60,61,62,63,64,65], XTT [66], MTS [67,68,69,70], WST-1 [71], lethality assays for brine shrimp [72,73,74], resazurin reduction test [75], and fluorescein diacetate assay [76The cell line used in the majority of investigations was HepG2, which is an isolated case of hepatocellular carcinoma. The reason for this might be because, with a survival rate of 20.6% worldwide, esophageal (20.6%) and pancreatic (11.5%) cancers are the two most common urgent health concerns, followed by liver (20.3%) tumors [77].K. excelsa's inner stem demonstrated strong anticancer activity against P388 with an IC50 value less than 1 µg/mL, according to recently published Proteaceae family research [78]. The activity of the compounds in the Proteaceae family was examined in almost half of the cytotoxicity studies conducted on them; some of these compounds have been the subject of prior research in other families. According to a summary published earlier [79], 2-methoxyjuglone was detected in about 20 species belonging to the groups Juglandaceae, Sterculiaceae, and Proteaceae; this finding was weaker than that of the research, which reported an IC50 value of 2.2 µg/mL [80]. In addition, 2.-methoxyjuglone demonstrated anticancer efficacy in vitro against a variety of human cancer cells, primarily examining breast cancer, colon adenocarcinoma, and hepatocellular carcinoma cells [188]. Another harmful substance present in G. robusta is graviquinone, which it demonstrates against MCF-7 (IC50: 15.0 ± 3.0 µM), NCI-H460 (10.8 ± 2.3 µM), and SF-268 cell lines (5.9 ± 0.1 µM) [80]. It also possesses cytotoxic properties against additional cell lines, with IC50 values ranging from 0.03 to 11.83 µM [81], such as lung tumors, squamous cell carcinoma, immortalized cells, and thymic lymphoma. As a result, graviquinone may be an exceptional cytotoxic agent for the treatment of several tumors. The chemical methyl 2,5-dihydroxycinnamate, which is present in G. robusta, has been found in the leaves and branches of Philadelphus coronaries [82] and Murraya paniculate [83]. It has the potential to exhibit cytotoxic effects on several types of tumors. At 11.3 ± 2.1 and 19.4 ± 1.9 µg/mL, respectively, hydroquinone from H. lobata leaves inhibited the MGC-803 and HEEC cell lines [62]. This substance has been examined and identified in both terrestrial and aquatic plants, as reported in cytotoxicity and antioxidant research.[84,85,86]

**Anti-Inflammatory Activity:**

A biological response to damaging stimuli, inflammation causes redness, diarrhea, swelling, discomfort, and even loss of function [87]. Acute and chronic inflammation are the two different categories of inflammation. While the human body uses inflammation to fight against external invaders, over 99% of inflammatory illnesses are severe, life-threatening, or can cause death, such as asthma [87]. Currently, steroidal and nonsteroidal synthetic molecular medications are used to treat pain and inflammation, but they frequently have toxic and unfavorable side effects [87, 88]. stomach side effects, such as bleeding, diarrhea, and stomach erosion, may occur with the combination of aspirin and mefenamic acid. Since many contemporary medications are also widely utilized by Aboriginal peoples, research has been done on plant-based anti-inflammatory drugs that have fewer adverse effects. The Aboriginal Dharawal people, for example, employ plants of the Eucalyptus genus as anti-inflammatory drugs [89]. Ten mechanisms of

cellular inhibition are employed in anti-inflammation activity: hormones related to arachidonic acid, cytokines, signaling pathways, nitric oxide (NO), reactive oxygen species (ROS), inflammatory mediators, immunological regulation, gut microbiota, and hypothalamic-pituitary-adrenal (HPA)-dependent anti-inflammatory drugs [90,91].

Anti-inflammatory activity, which was often given directly to the target cells, was also evaluated using animals as the study subject. Among the reported Proteaceae species (F. saligna, H. terminalis, H. salicifolia, and T. speciossissima), the roots of H. terminalis showed the strongest anti-inflammatory efficacy in NO expression, with an IC50 value of 11.98 ± 0.71 µg/mL. Several animals (F. speciosa: chicks; L. hirsute and G. robusta: pigs; G. robusta and L. hieronymi: rats) were employed in animal model experiments to examine the anti-inflammatory effects of several Proteaceae species. Through the inhibition of animal edema, these animal models are frequently employed in anti-inflammatory investigations [91]. Their bioactivity is affected by various extraction techniques, sample preparation, solvent usage, and sample location, as the anti-inflammatory activity shown. Different solvents were used to extract P. simplex, and the results showed a variety of inhibition at the same concentration [92]. Furthermore, in a research on G. avellana, varying sample roasting procedures resulted in a variance in inhibitory activity [93]. In order to better inform future research, it is crucial to look at the consequences of sample processing.

Two investigations only examined the anti-inflammatory properties of phytochemicals, focusing on H. terminalis [57] and L. hieronymi [94]. Bisresorcinol, which is present in the trunk of H. terminalis, possesses anti-aging properties against tyrosinase, collagenase, and elastase at 156.7 ± 0.7, 33.2 ± 0.5, and 22.8 µM/L, respectively, and anti-inflammatory properties in RAW 264.7 cells with an IC50 value of 71.15 ± 6.66 mg/mL [57]. It's possible that the primary cause of the anti-aging effect is the hydrogen bonds and π-electrons that bind the bisresorcinol and enzyme. Additionally, Grevillea glauca stems contain bisresorcinol and its derivatives [95]. Another substance contained in the Proteaceae family, oleanolic acid, has been thoroughly examined and documented in several research papers and patent applications, indicating its potential as a strong anti-inflammatory drug from 1980 to the present [96,97]. To find out whether the plant chemicals have any promise as anti-inflammatory medicines, further thorough research on the subject is advised.
With the exception of the fruits, all research on the Proteaceae family's anti-inflammatory properties has chosen to examine the leaves, flowers, stems, roots, nuts, honey, barks, and trunks.

**Antiviral Activity:**

A pandemic event typically happens throughout a person's lifetime due to the genetic variety of viruses. While numerous antiviral medications have been created in the past, viral resistance and the poor quality of some conventional medications prevent many pharmaceuticals from successfully targeting viruses. The application of plant materials to treat viral infections is therefore becoming more and more popular. Previous research that mainly focused on the herpes simplex virus (HSV), hepatitis C virus (HCV), influenza virus, and human immunodeficiency virus (HIV) have evaluated over 100 species [98]. The antiviral activity of several Proteaceae species has been investigated. Specifically, conocurvone, a derivative of naphthoquinone that is present in C. incurvum, can impede the effects of HIV-1RF in order to safeguard the T4-lymphoblastoid cell line [99]. Plants lacking Hakea saligna roots shown potential activity against the Ranikhet disease virus [100], with the barks of D. darlingiana and B. bleasdalei demonstrating action against HSV [101]. Neither Lomatia ferruginea leaves nor the barks of Banksia integrifolia, Cardwellia sublimis, or Buckinghamia celsissima had any antiviral action against HSV or HIV. Thus far, research on the inhibitory effects of several Proteaceae plants on viruses other than HIV, HSV, and Ranikhet sickness is limited. Antiviral research in the Proteaceae family is quite scarce in comparison to other in vitro bioactive investigations.

Other Bioactivities:

The Proteaceae family being explored for various bioactive characteristics that may be beneficial to human health. Human health depends on healthy food, as parasites may cause a number of diseases that can be contracted from food sources. Many tropical parasite infections, including trypanosomiasis, leishmaniasis, schistosomiasis, and malaria, can lead to significant illnesses and problems. Treatment for parasites has been applied to several plant groups, including Rutaceae, Myrtaceae, Papaveraceae, and Moraceae [102]. One of the plants with the potential to cure human parasites is the Proteaceae family. As of right now, the Proteaceae family's antiparasitic research has only chosen to examine Schistosoma mansoni, Leishmania species, and malaria. Botulin, quercetin-3-O-β-d-glucoside, and quercetin-3-O-β-d-rhamnoside have all been extracted from R. montana, and its aerial portions have demonstrated antiparasitic efficacy against S. mansoni [103]. At MIC values of 50 and 23.7 µg/mL, respectively, the wood of G. robusta and O. grandiflora showed in vitro antiparasitic activity against Leishmania promastigotes [71,104]. Malaria

is one of the biggest health issues in the world and can lead to very deadly illnesses. Research on antimalarial properties has been conducted on two plants belonging to the Proteaceae family. Faurea speciosa leaves and branches showed encouraging inhibitory action against Plasmodium spp. [,105,106]. Additionally, L. concinnum has long been used to treat malaria [107]. Proteaceae species have been suggested to have potential use in antiparasitic activity, with the aim of enhancing drug resistance and creating new plant-based products. Additionally, two investigations utilizing G. robusta and Serruria furcellata examined the melanogenesis inhibitory action; this may have been caused by the high value of arbutin derivatives [108, 109]. These two species might thus be used as skin-lightening and anti-chloasma agents. Arbutin and its derivatives have also been shown to be present in a greater variety of native species and to have promise as skin-lightening agents. Proteaceae member S. furcellata shown tyrosinase inhibitory properties to prevent melanin production [109] and may be employed as a possible inhibitor of freckles. The plant Kermadecia rotundifolia exhibited acetylcholinesterase inhibition [110]. It has the potential to replace Western medications and lessen the negative effects of chemical medications by acting as an acetylcholinesterase inhibitor. Additionally capable of treating cardiovascular conditions are the Proteaceae family of plants. Striata and robusta striatal have been shown in one research to be strong inhibitors of plasma membrane Ca2+-ATPase, suggesting that they may be employed to stimulate failing hearts [111].

**Traditional and Commercial use:**

The Proteaceae family has contributed to a variety of items in the culinary, medicinal, horticultural, and material industries, offering potential economic worth.Several Proteaceae species have produced food security through their fruits, seeds, nuts, and flowers. The worldwide nut market is significantly impacted by the fact that Australia produced and exported more than 50,000 tons of macadamia nuts in 2020 [112]. Compared to the value in 1987, this is a 30-fold increase and a 1.5-fold increase over the similar number for 2014 [113]. Toxic cyanogenic glycosides that humans cannot ingest are found in Macadamia jansenii and Macadamia ternifolia, but only Macadamia integrifolia and Macadamia tetraphylla may be eaten as food to give nutrients and perhaps medicinal compounds [113,114,115].Aboriginal people have long employed Proteaceae plants for a variety of therapeutic purposes, including inflammatory treatments, gastroenteritis, lung infections, eye infections, sore throats, skin infections, kidney difficulties, and liver illnesses . Oreocallis grandiflora, for instance, has flavonoids in its leaves and flowers, which may be utilized to treat diabetes and inflammation [71]. Numerous Proteaceae plants have anti-aging or skin-lightening properties. Certain species, nevertheless, are dangerous to humans. For example, direct contact with flowers or trees of the Greville genus can cause allergic contact dermatitis in those who are sensitive to resorcinol [116]. One other commercial application of the Proteaceae family is cultivation. Although Persoonia longifolia has been cultivated in the UK since 1850, it is not commonly utilized in Australia [117]. The Proteaceae family has three important cultivars: Protea, Leucospermum, and Leucadendron. However, additional Proteaceae species can also be used for decorative purposes. For example, the species Grevillea's drought tolerance makes it a suitable plant for landscaping, whereas the genus Banksia has been commercialized as cut and dried flowers [118]. Since the majority of Proteaceae species are shrubs or trees, they provide a good supply of lumber and support the materials industry. For instance, boomerangs are made from Grevillea and Hakea [119].

In Aboriginal cultures in Australia, the species Persoonia has long been utilized as food and medicine. For instance, the indigenous Aboriginal people of the Madjedbebe region still highly value the P. falcata fruit, which was once eaten as a plant-based diet between 65,000 and 53,000 years ago [120]. Various studies have shown that Persoonia species, such as P. pinifolia, P. linearis, and P. levis, are edible, particularly the best and softest fruits that are on the ground and taste like nibbling delicious candy floss [121,122,123,124]. The pulp is often consumed by New South Wales aboriginal people and the skin is discarded [122]. Depending on their way of life, some Aboriginal peoples consume the entire fruit sans the seed. Eating the entire fruit, however, is beneficial to human health since its many sections contain unique nutrients, metabolites, and bioactive chemicals [125], all of which need more research to establish their connections. When fully ripe, P. levis was referred to be the most often consumed "Indigenous bush lollies" [123]. Additionally, P. virgata has the potential to be grown for ornamentation [121]. Because of the saponins and tannins they contain, P. falcata's leaves and wood have been used as a plant-based medication for chest infections, diarrhea, and sore eyes [126, 127]. Additionally, certain Persoonia species, such as P. linearis and P. laurina, when used as a protective infusion, might stop fishing lines and thread from fraying [128, 129].

**Conclusion:**

Due to their reduced costs, easy local harvesting, and few side effects related to minerals, herbal plants are becoming more and more in demand globally. In addition to guaranteeing food security and offering dietary diversity, a variety

of herbal plants are being employed to produce novel medications. Numerous Proteaceae species may find use in a variety of sectors. These plants have historically been utilized by Australian Aboriginal groups as food and medicine, but pharmacokinetic and clinical research are needed to assess their safety, effectiveness, and bioavailability. Only a few species in the Proteaceae family have been quantified, and phytochemical research is still sparse in this family. For the fruit components of Proteaceae species, however, little phytochemical data is currently available. Numerous investigations on Proteaceae species' nutritional value and bioactivity have been carried out; yet, plant bioactivity is influenced by sample location, harvest time, extraction technique, and solvent selection. To increase the generation of bioactive qualities from natural plant sources, more research into these impacts is required. It may be worthwhile to investigate the various plant tissues belonging to the Proteaceae family in order to see whether they might be used as native products or in functional meals. Promising antibacterial and anti-inflammatory qualities have been demonstrated by Persoonia spp.; these qualities may be used as functional components or nutraceuticals in the future. Further research on nutrition and bioactivity in Persoonia species is advised. In general, Proteaceae fruit shows promise as a food that can support socioeconomic growth, environmental sustainability, and food consumption; nevertheless, further research is required to determine its safety.

**Reference:**


1. Jakubowski W, Bartosz G. Estimation of oxidative stress in Saccharomyces cerevisae with fluorescent probes. Int J Biochem Cell Biol. 1997;29:1297–1301.
2. Naczk M, Shahidi F. Phenolics in cereals, fruits and vegetables: Occurrence, extraction and analysis. J Pharm Biomed Anal. 2006;41:1523–1542.
3. Suffredini IB, Sader HS, Gonçalves AG, Reis AO, Gales AC, Varella AD, Younes RN. Screening of antibacterial extracts from plants native to the Brazilian Amazon rainforest and Atlantic forest. Braz J Med Biol Res. 2004;37:379–384.
4. Boots AW, Haenen GR, Bast A. Health effects of quercetin: From antioxidant to nutraceutical. Eur J Pharmacol. 2008;585:325–337.
5. Valko M, Rhodes CJ, Moncol J, Izakovic M, Mazur M. Free radicals, metals and antioxidants in oxidative stress-induced cancer. Chem Biol Interact. 2006;160:1–40.
6. Ames BN, Shigenaga MK, Hagen TM. Oxidants, antioxidants, and the degenerative diseases of aging. Proc Natl Acad Sci USA. 1993;90:7915–7922.
7. Duthie SJ, Ma A, Ross MA, Collins AR. Antioxidant supplementation decreases oxidative DNA damage in human lymphocytes. Cancer Res. 1996;56:1291–1295.
8. Vivekananthan DP, Penn MS, Sapp SK, Hsu A, Topol EJ. Use of antioxidant vitamins for the prevention of cardiovascular disease: Meta-analysis of randomised trials. Lancet. 2003;361:2017–2023.
9. Petrovska BB. Historical review of medicinal plants' usage. Pharmacognosy Reviews. 2012;6(11):1.
10. Silveira D, Boylan F. Medicinal plants: advances in phytochemistry and ethnobotany. Plants. 2023;12:1682.
11. Calixto JB. The role of natural products in modern drug discovery. Anais da Academia Brasileira de Ciências. 2019;91:e20190105
12. Rahman MH, Roy B, Chowdhury GM, Hasan A, Saimun MSR. Medicinal plant sources and traditional healthcare practices of forest-dependent communities in and around Chunati Wildlife Sanctuary in southeastern Bangladesh. Environmental Sustainability. 2022;5(2):207–241.
13. Uddin SJ. Screening of Bangladeshi medicinal plants for the isolation and structural elucidation of novel anti-cancer compounds [PhD thesis]. Griffith University, Queensland, Australia; 2010.
14. Burkill IH. A dictionary of the economic product of the Malay Peninsula. Vol 2. Kuala Lumpur, Malaysia: Ministry of Agriculture and Cooperatives; 1966.
15. Gor MC, Ismail I, Mustapha WAW, Zainal Z, Noor NM, Othman R, et al. Identification of cDNAs for jasmonic acid-responsive genes in Polygonum minus roots by suppression subtractive hybridization. Acta Physiol Plant. 2011;33:283–294.
16. Wan Hassan WE. Healing herbs of Malaysia. Kuala Lumpur: Federal Land Development Authority (FELDA); 2006.
17. Bunawan H, Talip N, Noor NM. Foliar anatomy and micromorphology of Polygonum minus Huds and their taxonomic implications. Aust J Crop Sci. 2011;5:123–127.

18. Almey AAA, Khan CAJ, Zahir IS, Suleiman KM, Aisyah MR, Rahim KK. Total phenolic content and primary antioxidant activity of methanolic and ethanolic extracts of aromatic plants leaves. Int Food Res J. 2010;17:1077–1084.

19. Uyub AM, Nwachukwu IN, Azlan AA, Fariza SS. In-vitro antibacterial activity and cytotoxicity of selected medicinal plant extracts from Penang Island Malaysia on metronidazole-resistant-Helicobacter pylori and some pathogenic bacteria. Ethnobotany Res Appl. 2010;8:95–106.

20. Mackeen MM, Ali AM, El-Sharkawy SH, Manap MY, Salleh KM, Lajis NH, et al. Antimicrobial and cytotoxic properties of some Malaysian traditional vegetables (Ulam). Pharm Biol. 1997;35:174–178.

21. Huda-Faujan N, Noriham A, Norrakiah AS, Babji AS. Antioxidant activity of plants methanolic extracts containing phenolic compounds. Afri J Biotechnol. 2009;8(3):484–489.

22. Ali AM, Mackeen MM, El-Sharkawy SH, Abdul Hamid J, Ismail NH, Ahmad F, et al. Antiviral and cytotoxic activities of some plants used in Malaysian indigenous medicine. Pertanika J Trop Agric Sci. 1996;19:129–136.

23. Abdullah MZ, Mavaddat MH, Mohd AJ. Antioxidant and anticancer activities of Polygonum minus, Alpinia galanga and Etlingera elatior. Open Conference Proc J. 2013.

24. Seigler DS. Plant Secondary Metabolism. 1st ed. Boston, MA, USA: Kluwer Academic Publishers; 1998.

25. Rodriguez-Casado A. The Health Potential of Fruits and Vegetables Phytochemicals: Notable Examples. Crit Rev Food Sci Nutr. 2016;56:1097–1107.

26. Huang Y, Xiao D, Burton-Freeman BM, Edirisinghe I. Chemical Changes of Bioactive Phytochemicals during Thermal Processing. In: Reference Module in Food Science. Elsevier: Amsterdam, the Netherlands; 2016.

27. Gadea A, Khazem M, Gaslonde T. Current knowledge on chemistry of Proteaceae family, and biological activities of their bis-5-alkylresorcinol derivatives. Phytochem Rev. 2022;21:1969–2005.

28. Yang F. Chemotaxonomy Study of Plants from the Family Proteaceae Based on Its Natural Product Profile (Alkaloid). PhD Thesis, Griffith University, Brisbane, Australia; 2017.

29. Boeing H, Bechthold A, Bub A, Ellinger S, Haller D, Kroke A, Leschik-Bonnet E, Müller MJ, Oberritter H, Schulze M, et al. Critical review: Vegetables and fruit in the prevention of chronic diseases. Eur J Nutr. 2012;51:637–663.

30. Lampe JW. Health effects of vegetables and fruit: Assessing mechanisms of action in human experimental studies. Am J Clin Nutr. 1999;70:475–490.
31. Konczak I, Roulle P. Nutritional properties of commercially grown native Australian fruits: Lipophilic antioxidants and minerals. Food Res Int. 2011;44:2339–2344.
32. Richmond R, Bowyer M, Vuong Q. Australian native fruits: Potential uses as functional food ingredients. J Funct Foods. 2019;62:103547.
33. Salvin S, Bourke M, Byrne T. The New Crop Industry Handbook. Barton, Australia: Rural Industries Research & Development Corporation; 2004. Vol 4:417–426.
34. Dissanayake IH, Zak V, Kaur K, Jaye K, Ayati Z, Chang D, Li CG, Bhuyan DJ. Australian native fruits and vegetables: Chemical composition, nutritional profile, bioactivity and potential valorization by industries. In: Critical Reviews In Food Science and Nutrition. Abingdon, UK: Taylor & Francis; 2022. pp. 1–34.

35. Munteanu IG, Apetrei C. Analytical Methods Used in Determining Antioxidant Activity: A Review. Int J Mol Sci. 2021;22:3380.
36. Prior RL, Wu X, Schaich K. Standardized methods for the determination of antioxidant capacity and phenolics in foods and dietary supplements. J Agric Food Chem. 2005;53:4290–4302.
37. Chaves N, Santiago A, Alías JC. Quantification of the Antioxidant Activity of Plant Extracts: Analysis of Sensitivity and Hierarchization Based on the Method Used. Antioxidants. 2020;9:76.
38. NSW Food Authority. NSW Government Food Safety Strategy 2015–2021. Newington, Australia: NSW Food Authority; 2021.
39. Zhang J, Phan ADT, Srivarathan S, Akter S, Sultanbawa Y, Cozzolino D. Proximate composition, functional and antimicrobial properties of wild harvest Terminalia carpentariae fruit. J Food Meas Charact. 2022;16:582–589.
40. Courtney R, Sirdaarta J, Matthews B, Cock IE. Tannin components and inhibitory activity of Kakadu plum leaf extracts against microbial triggers of autoimmune inflammatory diseases. Pharmacogn J. 2015;7:18–31.
41. Wigmore S, Naiker M, Bean D. Antimicrobial Activity of Extracts from Native Plants of Temperate Australia. Pharmacogn Commun. 2016;6:80–84.
42. Boyer H, Cock IE. Evaluation of the potential of Macadamia integriflora extracts as antibacterial food agents. Pharmacogn Commun. 2013;3:53.
43. Luís Â, Cruz C, Duarte AP, Domingues F. An Alkenylresorcinol Derivative from Hakea sericea Fruits and their Antimicrobial Activity. Nat Prod Commun. 2013;8.
44. Balouiri M, Sadiki M, Ibnsouda SK. Methods for in vitro evaluating antimicrobial activity: A review. J Pharm Anal. 2016;6:71–79.
45. Veiga A, Toledo MGT, Rossa LS, Mengarda M, Stofella NCF, Oliveira LJ, Gonçalves AG, Murakami FS. Colorimetric microdilution assay: Validation of a standard method for determination of MIC, IC50%, and IC90% of antimicrobial compounds. J Microbiol Methods. 2019;162:50–61.
46. Elshikh M, Ahmed S, Funston S, Dunlop P, McGaw M, Marchant R, Banat IM. Resazurin-based 96-well plate microdilution method for the determination of minimum inhibitory concentration of biosurfactants. Biotechnol Lett. 2016;38:1015–1019.
47. Razafintsalama V, Sarter S, Mambu L, Randrianarivo R, Petit T, Rajaonarison JF, Mertz C, Rakoto D, Jeannoda V. Antimicrobial activities of Dilobeia thouarsii Roemer and Schulte, a traditional medicinal plant from Madagascar. South Afr J Bot. 2013;87:1–3.
48. Canales N, Montenegro I, Párraga M, Olguín Y, Godoy P, Werner E, Madrid A. In vitro antimicrobial activity of Embothrium coccineum used as traditional medicine in Patagonia against multiresistant bacteria. Molecules. 2016;21:1441.
49. Setzer MC, Schmidt JM, Irvine AK, Jackes B, Setzer W. Biological activity of rainforest plant extracts from Far North Queensland, Australia. Aust J Med Herbal. 2006;18:6–20.
50. Violante IM, Hamerski L, Garcez WS, Batista AL, Chang MR, Pott VJ, Garcez FR. Antimicrobial activity of some medicinal plants from the cerrado of the central-western region of Brazil. Braz J Microbiol. 2012;43:1302–1308.
51. Mølgaard P, Holler JG, Asar B, Liberna I, Rosenbæk LB, Jebjerg CP, Jørgensen L, Lauritzen J, Guzman A, Adsersen A, et al. Antimicrobial evaluation of Huilliche plant medicine used to treat wounds. J Ethnopharmacol. 2011;138:219–227.
52. WHO. Cancer Over Time.
53. Solowey E, Lichtenstein M, Sallon S, Paavilainen H, Solowey E, Lorberboum-Galski H. Evaluating Medicinal Plants for Anticancer Activity. Sci World J. 2014;2014:721402.
54. Larramendy M, Soloneski S. Genotoxicity: A Predictable Risk to Our Actual World. London, UK: IntechOpen; 2018.
55. Wang P, Henning SM, Heber D. Limitations of MTT and MTS-Based Assays for Measurement of Antiproliferative Activity of Green Tea Polyphenols. PLoS ONE. 2010;5:e10202.
56. Deng JZ, Starck SR, Sun DA, Sabat M, Hecht SM. A new 7,8-euphadien-type triterpenoid from Brackenridgea nitida and Bleasdalea bleasdalei that inhibits DNA polymerase beta. J Nat Prod. 2000;63:1356–1360.
57. Giang PM, Thao DT, Nga NT, Van Trung B, Anh DH, Viet PH. Evaluation of the Antioxidant, Hepatoprotective, and Anti-Inflammatory Activities of Bisresorcinol Isolated from the Trunk of Heliciopsis Terminalis. Pharm Chem J. 2019;53:628–634.
58. Perry NB, Brennan NJ. Antimicrobial and cytotoxic phenolic glycoside esters from the New Zealand tree Toronia toru. J Nat Prod. 1997;60:623–626.

59. Razafintsalama V, Girardot M, Randrianarivo R, Rakoto D, Sarter S, Petit T, Ralambonirina S, Deville A, Grellier P, Jeannoda V, et al. Dilobenol A–G, Diprenylated Dihydroflavonols from the Leaves of Dilobeia thouarsii. Eur J Org Chem. 2013;2013:1929–1936.
60. Yu H, Zhang X, Li X, Zeng F, Ruan H. 2-Methoxyjuglone Induces Apoptosis in HepG2 Human Hepatocellular Carcinoma Cells and Exhibits in Vivo Antitumor Activity in a H22 Mouse Hepatocellular Carcinoma Model. J Nat Prod. 2013;76:889–895.
61. Jolly C, Thoison O, Martin M-T, Dumontet V, Gilbert A, Pfeiffer B, Léonce S, Sévenet T, Guéritte F, Litaudon M. Cytotoxic turrianes of Kermadecia elliptica from the New Caledonian rainforest. Phytochemistry. 2008;69:533–540.
62. Qi W, Ou N, Wu X, Xu H. New arbutin derivatives from the leaves of Heliciopsis lobata with cytotoxicity. Chin J Nat Med. 2016;14:789–793.
63. Kamagaju L, Morandini R, Bizuru E, Nyetera P, Nduwayezu JB, Stévigny C, Ghanem G, Duez P. Tyrosinase modulation by five Rwandese herbal medicines traditionally used for skin treatment. J Ethnopharmacol. 2013;146:824–834.
64. Ebrahim H, Osman S, Haffez H, Hassan Z. In-vitro screening of some plant extracts for their potential anticancer activity. Afr J Tradit Complement Altern Med. 2020;17:1–8.
65. Fiorito S, Epifano F, Bruyère C, Mathieu V, Kiss R, Genovese S. Growth inhibitory activity for cancer cell lines of lapachol and its natural and semi-synthetic derivatives. Bioorg Med Chem Lett. 2014;24:454–457.
66. Gasa N. Antibiofilm Activity of South African Plant Extracts Against Mycobacterium spp. and Their Mechanism of Action Using Mycothiol Reductase. Ph.D. Thesis, University of Pretoria, Pretoria, South Africa, 2015.
67. Setzer MC, Setzer WN, Jackes BR, Gentry GA, Moriarity DM. The Medicinal Value of Tropical Rainforest Plants from Paluma, North Queensland, Australia. Pharm Biol. 2001;39:67–78.
68. Chuang T-H, Chan H-H, Wu T-S, Li C-F. Chemical Constituents and Biological Studies of the Leaves of Grevillea robusta. Molecules. 2011;16:9331–9339.
69. Khazem M, Gaslonde T, Dumontet V, Poullain C, Litaudon M, Michel S. Cytotoxic turrianes from Kermadecia elliptica: Hemisynthesis and biological activities of kermadecin A derivatives. Phytochem Lett. 2014;10:249–254.
70. Chuang T, Wu P. Cytotoxic 5-Alkylresorcinol Metabolites from the Leaves of Grevillea robusta. J Nat Prod. 2007;70:319–323.
71. Vinueza D, Yanza K, Tacchini M, Grandini A, Sacchetti G, Chiurato MA, Guerrini A. Flavonoids in Ecuadorian Oreocallis grandiflora (Lam.) R. Br.: Perspectives of Use of This Species as a Food Supplement. Evid-Based Complement Altern Med. 2018;2018:1353129.
72. Violante IM, Hamerski L, Garcez WS, Batista AL, Chang MR, Pott VJ, Garcez FR. Antimicrobial activity of some medicinal plants from the cerrado of the centralwestern region of Brazil. Braz J Microbiol. 2012;43:1302–1308.
73. Ullah M, Sikder MAA, Sharmin T, Rashid M. Pharmacological Activities of Grevillea robusta, a Medicinal Plant of Bangladesh. Bangladesh Phramaceutical J. 2014;17:135–137.
74. Cantrell CL, Berhow MA, Phillips BS, Duval SM, Weisleder D, Vaughn SF. Bioactive crude plant seed extracts from the NCAUR oilseed repository. Phytomedicine. 2003;10:325–333.
75. Akhtar MA. Australian Native Plants—A Source of Novel Anti-Inflammatory Compounds. Ph.D. Thesis, Western Sydney University, Sydney, Australia, 2018.
76. Marcus JP, Goulter KC, Green JL, Harrison SJ, Manners JM. Purification, Characterisation and cDNA Cloning of an Antimicrobial Peptide from Macadamia integrifolia. Eur J Biochem. 1997;244:743–749.
77. Howlader N, Noone AM, Krapcho M, Miller D, Brest A, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, et al. SEER Cancer Statistics Review, 1975–2018. National Cancer Institute: Bethesda, MD, USA; 2021.
78. Lang G, Cole ALJ, Blunt JW, Robinson WT, Munro MHG. Excelsione, a Depsidone from an Endophytic Fungus Isolated from the New Zealand Endemic Tree Knightia excelsa. J Nat Prod. 2007;70:310–311.
79. Yu HY, Liu L, Li J, Liu D, Ruan HL. 2-Methoxyjuglone, a Promising Bioactive Compound for Pharmaceutical and Agricultural Purposes: A Review. Curr Med Sci. 2022;42:905–912.
80. Brotz E, Herrmann J, Wiese J, Zinecker H, Maier A, Kelter G, Imhoff JF, Müller R, Paululat T. Synthesis and Cytotoxic Activity of a Small Naphthoquinone Library: First Synthesis of Juglonbutin. Eur J Org Chem. 2014;2014:5318–5330.
81. Fási L, Di Meo F, Kuo C-Y, Stojkovic Buric S, Martins A, Kúsz N, Béni Z, Dékány M, Balogh GT, Pesic M, et al. Antioxidant-Inspired Drug Discovery: Antitumor Metabolite Is Formed in Situ from a Hydroxycinnamic Acid Derivative upon Free-Radical Scavenging. J Med Chem. 2019;62:1657–1668.

82. Shabbir M, Ziauddin Sultani S, Jabbar A, Iqbal Choudhary M. Cinnamates and coumarins from the leaves of Murraya paniculata. Phytochemistry. 1997;44:683–685.
83. Ng MK, Abdulhadi-Noaman Y, Cheah YK, Yeap SK, Alitheen N. Bioactivity studies and chemical constituents of Murraya paniculata (Linn) Jack. Int Food Res J. 2012;19:1306–1312.
84. Whysner J, Verna L, English JC, Williams GM. Analysis of studies related to tumorigenicity induced by hydroquinone. Regul Toxicol Pharmacol. 1995;21:158–176.
85. Bertanha CS, Januário AH, Alvarenga TA, Pimenta LP, Silva MLAe, Cunha WR, Pauletti PM. Quinone and hydroquinone metabolites from the ascidians of the genus Aplidium. Mar Drugs. 2014;12:3608–3633.
86. Sunassee S, Davies-Coleman M. Cytotoxic and antioxidant marine prenylated quinones and hydroquinones. Nat Prod Rep. 2012;29:513–535.
87. Beg S, Swain S, Hasan H, Barkat MA, Hussain MS. Systematic review of herbals as potential anti-inflammatory agents: Recent advances, current clinical status and future perspectives. Pharmacogn Rev. 2011;5:120–137.
88. Dvorakova M, Landa P. Anti-inflammatory activity of natural stilbenoids: A review. Pharmacol Res. 2017;124:126–145.
89. Akhtar MA, Raju R, Beattie KD, Bodkin F, Münch G. Medicinal plants of the Australian Aboriginal Dharawal people exhibiting anti-inflammatory activity. Evid Based Complement Alternat Med. 2016;2016:2935403.
90. Oguntibeju OO. Medicinal plants with anti-inflammatory activities from selected countries and regions of Africa. J Inflamm Res. 2018;11:307–317.
91. Hongzhi D, Xiaoying H, Yujie G, Le C, Yuhuan M, Dahui L, Luqi H. Classic mechanisms and experimental models for the anti-inflammatory effect of traditional Chinese medicine. Anim Models Exp Med. 2022;5:108–119.
92. Fawole OA, Ndhlala AR, Amoo SO, Finnie JF, Van Staden J. Anti-inflammatory and phytochemical properties of twelve medicinal plants used for treating gastro-intestinal ailments in South Africa. J Ethnopharmacol. 2009;123:237–243.
93. Pino Ramos LL, Jiménez-Aspee F, Theoduloz C, Burgos-Edwards A, Domínguez-Perles R, Oger C, Durand T, Gil-Izquierdo Á, Bustamante L, Mardones C, et al. Phenolic, oxylipin and fatty acid profiles of the Chilean hazelnut (Gevuina avellana): Antioxidant activity and inhibition of pro-inflammatory and metabolic syndrome-associated enzymes. Food Chem. 2019;298:125026.
94. Alvarez ME, Rotelli AE, Pelzer LE, Saad JR, Giordano O. Phytochemical study and anti-inflammatory properties of Lampaya hieronymi Schum. ex Moldenke. Il Farmaco. 2000;55:502–505.
95. Wang H, Leach DN, Thomas MC, Blanksby SJ, Forster PI, Waterman PG. Bisresorcinol Derivatives from Grevillea glauca. Helv Chim Acta. 2011;94:1812–1819.
96. Chen YP. Recent developments of natural product chemistry in Taiwan. Korean J Pharmacogn. 1980;11:163–172.
97. Kashyap D, Sharma A, Tuli HS, Punia S, Sharma AK. Ursolic Acid and Oleanolic Acid: Pentacyclic Terpenoids with Promising Anti-Inflammatory Activities. Recent Pat Inflamm Allergy Drug Discov. 2016;10:21–33.
98. Denaro M, Smeriglio A, Barreca D, De Francesco C, Occhiuto C, Milano G, Trombetta D. Antiviral activity of plants and their isolated bioactive compounds: An update. Phytother Res. 2020;34:742–768.
99. Decosterd LA, Parsons IC, Gustafson KR, Cardellina JH II, McMahon JB, Cragg GM, Murata Y, Pannell LK, Steiner JR. HIV inhibitory natural products. 11. Structure, absolute stereochemistry, and synthesis of conocurvone, a potent, novel HIV-inhibitory naphthoquinone trimer from a Conospermum sp. J Am Chem Soc. 1993;115:6673–6679.
100. Dhar M, Dhawan BN, Prasad C, Rastogi R, Singh K, Tandon J. Screening of Indian plants for biological activity: Part V. Indian J Exp Biol. 1974;12:512–523.
101. Setzer, M.C.; Setzer, W.N.; Jackes, B.R.; Gentry, G.A.; Moriarity, D.M. The Medicinal Value of Tropical Rainforest Plants from Paluma, North Queensland, Australia. Pharm. Biol. 2001, 39, 67–78.
102. Wink, M. Medicinal plants: A source of anti-parasitic secondary metabolites. Molecules 2012, 17, 12771–12791.
103. Cunha, N.L.; Uchôa, C.J.d.M.; Cintra, L.S.; Souza, H.C.d.; Peixoto, J.A.; Silva, C.P.; Magalhães, L.G.; Gimenez, V.M.M.; Groppo, M.; Rodrigues, V.; et al. In Vitro Schistosomicidal Activity of Some Brazilian Cerrado Species and Their Isolated Compounds. Evid.-Based Complement. Altern. Med. 2012, 2012, 173614.
104. Takahashi, M.; Fuchino, H.; Satake, M.; Agatsuma, Y.; Sekita, S. In Vitro Screening of Leishmanicidal Activity in Myanmar Timber Extracts. *Biol. Pharm. Bull.* **2004**, *27*, 921–925.
105. Aubouy, A.; Camara, A.; Haddad, M. Chapter 8—Medicinal plants from West Africa used as antimalarial agents: An overview. In *Medicinal Plants as Anti-Infectives*; Chassagne, F., Ed.; Academic Press: Cambridge, MA, USA, 2022; 267–306.

106. Laryea, M.K.; Borquaye, L.S. Antimalarial Efficacy and Toxicological Assessment of Extracts of Some Ghanaian Medicinal Plants. *J. Parasitol. Res.* **2019**, *2019*, 1630405.
107. Cock, I.E.; Selesho, M.I.; van Vuuren, S.F. A review of the traditional use of southern African medicinal plants for the treatment of malaria. *J. Ethnopharmacol.* **2019**, *245*, 112176.
108. Yamashita-Higuchi, Y.; Sugimoto, S.; Matsunami, K.; Otsuka, H.; Nakai, T. Grevillosides J-Q, arbutin derivatives from the leaves of *Grevillea robusta* and their melanogenesis inhibitory activity. *Chem. Pharm. Bull.* **2014**, *62*, 364–372. [
109. Sonka, L. *Exploring Anti-Tyrosinase Bioactive Compounds from the Cape Flora*; University of the Western Cape: Cape Town, South Africa, 2018.
110. Beniddir, M.A.; Simonin, A.-L.; Martin, M.-T.; Dumontet, V.; Poullain, C.; Guéritte, F.; Litaudon, M. Turrianes from Kermadecia rotundifolia as new acetylcholinesterase inhibitors. *Phytochem. Lett.* **2010**, *3*, 75–78.
111. Roufogalis, B.D.; Li, Q.; Tran, V.H.; Kable, E.P.W.; Duke, C.C. Investigation of plant-derived phenolic compounds as plasma membrane Ca2+-ATPase inhibitors with potential cardiovascular activity. *Drug Dev. Res.* **1999**, *46*, 239–249.
112. USDA. Tree Nuts Annual. 2020.
113. Weston, P.H. *Flora of Australia Volume 16, Elaeagnaceae, Proteaceae 1*; CSIRO Australia: Melbourne, Australia, 1995.
114. Insanu, M.; Hartati, R.; Bajri, F.; Fidrianny, I. Macadamia Genus: An Updated Review of Phytochemical Compounds and Pharmacological Activities. *Biointerface Res. Appl. Chem.* **2021**, *11*, 14898–14905.
115. Carrillo, W.; Carpio, C.; Morales, D.; Vilcacundo, E.; Alvarez, M. Fatty acids composition in macadamia seed oil (*Macadamia integrifolia*) from Ecuador. *Asian J. Pharm. Clin. Res.* **2017**, *10*, 303–306.
116. Rozas-Muñoz, E.; Gamé, D.; Mir-Bonafé, J.-F.; Piquero-Casals, J. Plant Contact Dermatitis in 2021. *Curr. Treat. Options Allergy* **2022**, *9*, 76–90.
117. Chia, K.A.; Koch, J.M.; Sadler, R.; Turner, S.R. Developmental phenology of *Persoonia longifolia* (*Proteaceae*) and the impact of fire on these events. *Aust. J. Bot.* **2015**, *63*, 415–425.
118. Criley, R.A. *Proteaceae*: Beyond the big three. *Acta Hortic.* **2000**, *545*, 79–85.
119. Wightman, G.M.; Jackson, D.M.; Williams, L.L.V. *Alawa Ethnobotany: Aboriginal Plant Use from Minyerri, Northern Australia*; Conservation Commission of the Northern Territory: Palmerston City, Australia, 1991.
120. Florin, S.A.; Fairbairn, A.S.; Nango, M.; Djandjomerr, D.; Marwick, B.; Fullagar, R.; Smith, M.; Wallis, L.A.; Clarkson, C. The first Australian plant foods at Madjedbebe, 65,000–53,000 years ago. *Nat. Commun.* **2020**, *11*, 924.
121. Bauer, L.M.; Johnston, M. *Propagation of Persoonia Virgarta for the Development of a New Floricultural Export Crop*; The Australian Flora Foundation: Willoughby, Australia, 1999.
122. Stewart, K.; Percival, B. *Bush Foods of New South Wales: A Botanic Record and an Aboriginal Oral History*; Royal Botanic Gardens: Sydney, Australia, 1997.
123. Renwick, C. *Geebungs and Snake Whistles: Koori People and Plants of Wreck Bay*; Aboriginal Studies Press: Canberra, Australia, 2000.
124. Robinson, L. *Field Guide to the Native Plants of Sydney*; Simon & Schuster Australia: Cammeray, Australia, 2003.
125. Edwards, C.A.; Havlik, J.; Cong, W.; Mullen, W.; Preston, T.; Morrison, D.J.; Combet, E. Polyphenols and health: Interactions between fibre, plant polyphenols and the gut microbiota. *Nutr. Bull.* **2017**, *42*, 356–360.
126. Isaacs, J. *Bush Food: Aboriginal Food*; Weldons: McMahons Point, Australia, 1987. [
127. ACNT. *Traditional Bush Medicines: An Aboriginal Pharmacopoeia*; Greenhouse Publications: Melbourne, Australia, 1988.
128. Turbet, P. *The Aborigines of the Sydney District before 1788*; Langaroo Press: Sydney, Australia, 1989.
129. Nash, D. *Aboriginal Plant Use in South-Eastern Australia*; Australian National Botanic Gardens: Canberra, Australia, 2004.