



Review

# Aboriginal Food Practices and Australian Native Plant-Based Foods: A Step toward Sustainable Food Systems

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**Abstract:** The current food system and food choices have resulted in the increased human use of natural resources such as water and soil, and have directly impacted the ‘Global Syndemic’—climate change, obesity, and undernutrition. Revitalising Indigenous food systems and incorporating native plant-based foods into current food systems may have the potential to reduce diet-linked chronic diseases and environmental degradation, and are important steps toward Indigenous rights and self-determination. This study aims to identify and describe Aboriginal food practices and Australian native plant-based foods and their social, environmental, and economic impacts on sustainable food systems. A scoping review was conducted using the five-stage framework informed by Arksey and O’Malley. To describe the results, the framework for sustainable food systems from the Food and Agriculture Organization of the United Nations—FAO was used. Articles were included if they described the impacts of Aboriginal food practices on sustainable food systems, were confined to studies that were conducted in the Australian context, and included native Australian plant-based foods. A total of 57 studies were identified that met the inclusion criteria. The major social impacts incorporated the nutritional and health benefits of Australian native plant-based foods, such as antidiabetic properties, anticancer and antioxidant activities, and cultural identification, involving Aboriginal ecological knowledge and their connection to their country. Within the environmental impacts category, studies showed that Australian native plant-based foods have environmental stress tolerance and some ecosystem benefits. The main economic impacts discussed in the literature were the source of income for remote communities and the potential market for Australian native plant-based foods. This review demonstrates that Aboriginal food practices and Australian native plant-based foods can contribute to more sustainable food systems and diets and give more voice and visibility to Aboriginal knowledge and aspirations. More research and investments are needed to face the challenges of including these foods in our current food systems.

**Keywords:** food system; Indigenous food systems; native food; traditional knowledge; sustainability



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## 1. Introduction

The world has been facing a ‘Global Syndemic’: an interconnected and mutually reinforcing pandemic of obesity, undernutrition, and climate change [1–3]. Addressing the Global Syndemic and achieving the current international sustainability targets, such as the Paris Climate Agreement and the United Nations’ Sustainable Development Goals, require an approach that promotes sustainable food systems [3].

Obesity, which is defined as a body mass index (BMI) > 30 kg/m<sup>2</sup> and is caused by different risk factors such as physiological, genetic, behavioural, and environmental factors, affects 2 billion people worldwide [3] and is linked to a rising incidence of noncommunicable diseases (NCDs) such as stroke, diabetes, cancer, and coronary heart diseases [4], which are responsible for 4 million deaths globally [5]. In Australia, obesity prevalence has increased from 21% in 2006 to 26% in 2019 [6], and more than 60% of adults are overweight or obese [7]. The annual productivity loss due to obesity is estimated to be between 840 million and 14.9 billion [7]. Globally, 821 million people are undernourished [8], almost half

of child deaths are related to undernutrition [9], and more than 1 billion people face food insecurity [5]. Food and nutrition security are directly affected by climate change [3,9].

Extreme weather events result in crop losses, which raises food prices and directly impacts food access, particularly in lower-income countries [10]. Every year, more than one-third of all food produced for human consumption is lost or wasted across the global supply chain, resulting in USD \$936 billion in environmental and social costs [11]. In Australia, climate change has impacted the food supply chain, and the cost of fresh food in Australia continues to grow, and the number of Australians requesting food assistance has increased in recent years [12]. Furthermore, environmental stressors negatively impact the nutritional composition of foods [13]. The nutritional quality of foods depends on balancing ecosystems, water availability, soil quality, temperature, and pollinator abundance [10]. For example, with rising atmospheric carbon dioxide concentration, there is a decrease in protein and micronutrients in grains and legumes [14,15]. This may contribute to increases in micronutrient deficiencies, a form of malnutrition, which affects 2 billion people, mainly among pregnant women and children under 5 years old [16].

Food choices and the current food system have directly impacted the Global Syndemic. The population growth and the rapid increase in human use of natural resources, such as energy, water, and soil, are related to this climate crisis [1,8]. Agriculture and livestock production uses 70% of freshwater [1,13,17], approximately 40% of global arable land [1,18], and produces 20–30% of greenhouse gas emissions [8,19]. On the other hand, a sustainable food system (SFS) is one that provides food security and nutrition for everyone without compromising the economic, social, and environmental bases necessary to maintain food security and nutrition for future generations [20].

Clark et al. [21] and Willet et al. [4] found that the consumption of fruits, vegetables, legumes, and minimally processed whole grains are related to reduced risk of mortality and of diseases such as coronary heart diseases, stroke, and diabetes. At the same time, these food groups had the lowest environmental impacts [4]. On the other hand, unprocessed and processed red meat had the highest negative health and environmental impacts [21]. Currently many food-based dietary guidelines recommend food choices based on increasing the consumption of plant-based foods while reducing the consumption of animal-based foods (primarily red and processed meat) and ultraprocessed foods, which are high in saturated fat, added sugar, and sodium [3,8,13].

Integrating Australian native plant-based foods into current diets and food systems and revitalising Indigenous food systems may be a way to support healthy and sustainable diets and food systems [22]. According to Sarkar et al. [23], the reincorporation of native plant-based foods and traditional food practices are essential strategies to face climate change and diet-linked chronic diseases. For centuries, Indigenous people worldwide have applied their wisdom and knowledge about food practices using sustainable approaches to grow and prepare food [23]. For First Nations peoples, food is connected to their history, identity, and land, and it is part of their social, emotional, and spiritual wellbeing [24,25]. Studies worldwide and in Australia show the importance of native plant-based foods for sustainable food systems and diets due their nutrient and antioxidant content and their high tolerance to environmental stress compared to Western food [22,26–29]. This scoping review aims to identify and describe Aboriginal food practices and the Australian native plant-based foods and their social, environmental, and economic impacts to sustainable food systems. The following research question was used to guide this scoping review:

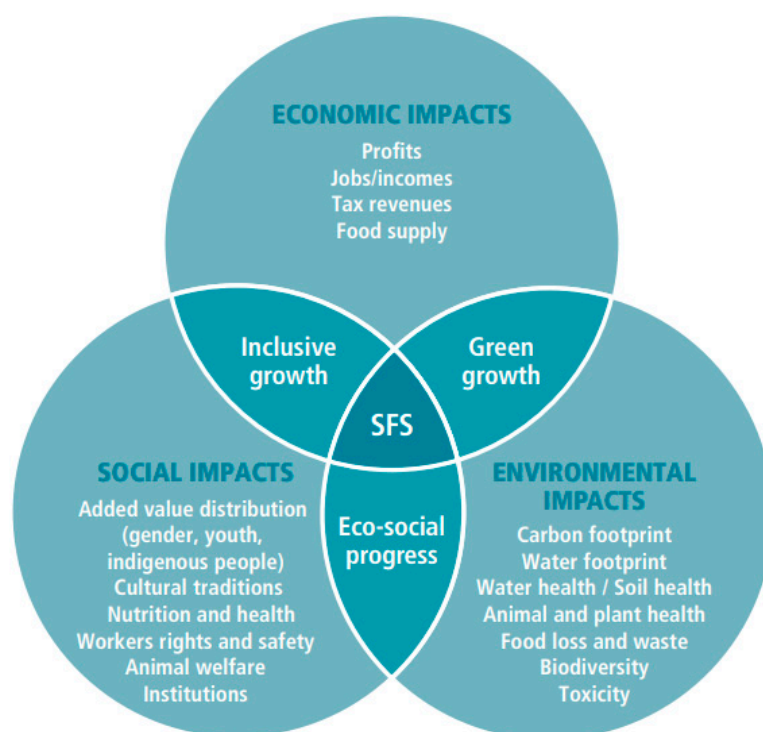
What are the social, environmental, and economic impacts of Aboriginal food practices and Australian native plant-based foods on sustainable food systems?

## 2. Materials and Methods

### 2.1. Study Design

A scoping review was conducted including both peer-reviewed academic and grey literature. A scoping review was chosen as the most suitable form of reviewing method for the research question because it allows for a broad overview of available evidence on

the studied topic [30]. The five-stage framework informed by Arksey and O'Malley [31] was used, which includes (1) identifying the research question; (2) identifying relevant studies; (3) selecting the studies; (4) charting the data according to key themes; and (5) collating, summarising, and reporting the results. To describe the results, the framework for sustainable food systems from Food and Agriculture Organization of the United Nations—FAO was used [20] (Figure 1). This framework includes three categories of impacts for sustainable food systems: economic, social, and environmental impacts. Within economic impacts are job opportunities, profits, tax revenues, and food supply. Some of the social impacts include cultural traditions, nutrition, and health, while environmental impacts incorporate biodiversity, carbon footprint, soil and plant health, and food waste [20]. The review followed a predefined protocol that was registered with International Prospective Register of Systematic Reviews (PROSPERO) database (ID no: CRD42022352114) on 19 August 2022 and is available at: [https://www.crd.york.ac.uk/prospero/display\\_record.php?RecordID=352114](https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=352114), registered on 19 August 2022.



**Figure 1.** Sustainability in food systems [20]. This image is licensed under the CC BY-NC-SA 3.0 IGO license. Reprinted with permission from © 2018 Food and Agriculture Organization of the United Nations [20].

## 2.2. Eligibility Criteria

Articles were included if they described the connection between Australian native plant-based and/or Aboriginal food practices (cultivation, preparation, and consumption) and their social, economic, or environmental impacts. The exclusion criteria included articles where Australia was not the focus, articles written in a language other than English, and articles not related to Australian native plant-based foods and Aboriginal food systems (e.g., articles focusing on Aboriginal knowledge about water management, ecological knowledge, and articles related to native animal source origin foods).

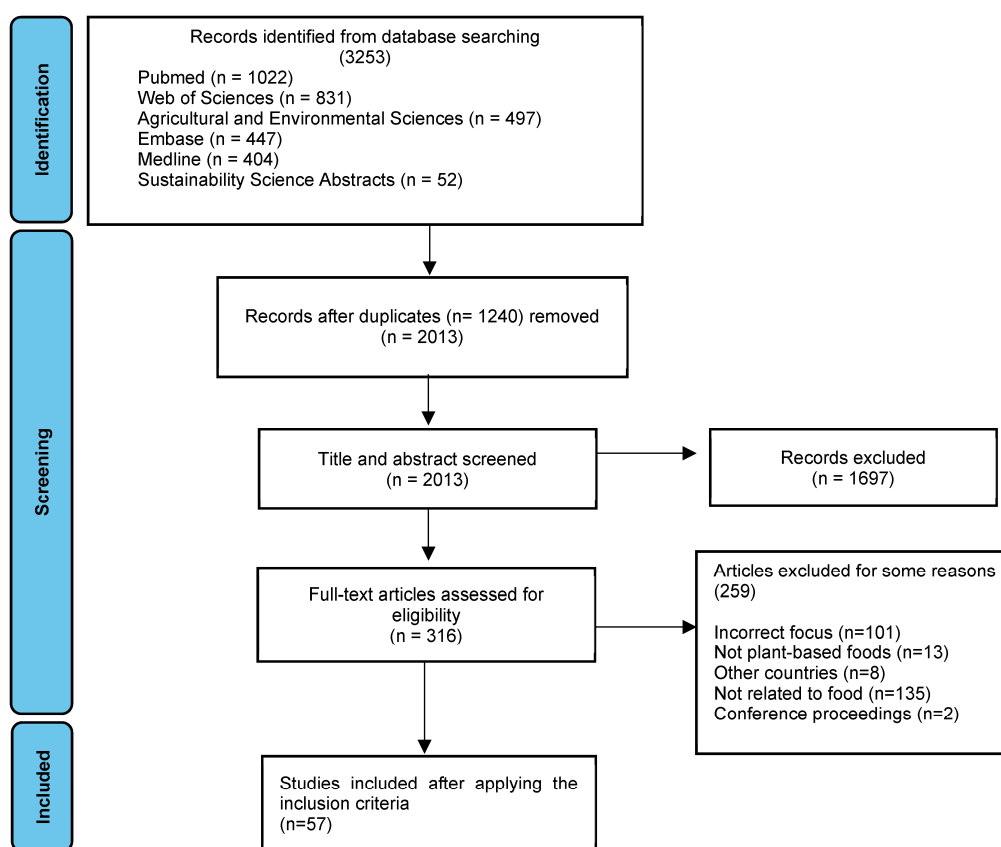
## 2.3. Search Strategy—Identifying Relevant Studies

Key words related to the topic of interest were selected using the National Library of Medicine's MeSH (Medical Subject Headings) terminology. The databases used for the peer-reviewed articles were Medline, Pubmed, Embase, Web of Science, Sustainability

Science Abstracts, and Agricultural and Environmental Sciences. A comprehensive search strategy including the key words is described in Table A1. The search strategy was applied on 14 October 2022.

#### 2.4. Study Selection

The citation management program EndNote X9 was used to import each article. Papers were initially screened based on title and abstract by one researcher (CL). At the second stage, the researcher examined each potential article and decided whether to include it or not using the inclusion criteria. If the researcher was unsure whether to include the article in the review, the other three researchers (SM, RR, JH) were consulted. Figure 2 shows the procedure of identification and screening process for selecting the papers.



**Figure 2.** Flowchart of identification and screening process for selection of papers exploring the Aboriginal food practices and Australian native plant-based foods and their contribution to sustainable food systems.

#### 2.5. Data Extraction

Data extraction was conducted using a pre-prepared summary table developed by the research team, which included (1) study details (authors, title, objectives, methods); (2) main results (relating to social, economic, and environmental impacts of Australian native plant-based foods on sustainable foods systems); (3) challenges/ limitations for including Australian native plant-based foods in the current food system.

### 3. Results

#### 3.1. Search Results

As shown in Figure 2, a total of 3253 possible relevant records were identified using the search strategy on the electronic databases (PubMed = 1022, Web of Sciences = 831, Agricultural and Environmental Sciences = 497, Embase = 447, Medline = 404, and Sus-

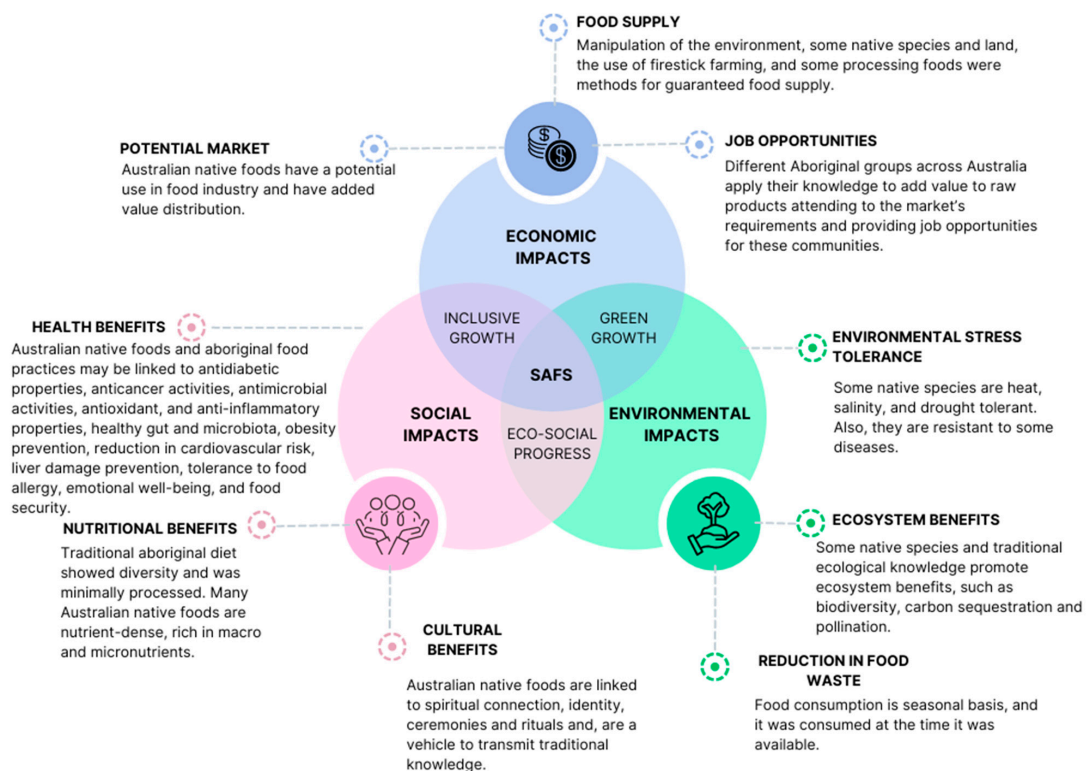
tainability Science Abstracts = 52), which was reduced to 2013 after deleting duplicates. After the first screening (abstract and title), 1697 studies were excluded, and 316 studies were selected to the second stage. From the 316 studies full-text-screened, 57 studies were included in the analysis, and 259 studies were excluded due to various reasons (Figure 2).

### 3.2. Study Characteristics

Study characteristics of each included study are provided in Table A2. From those 57 included studies, 51 discussed the social impacts of Aboriginal food practices and Australian native plant-based foods, including in this category health, nutritional, and cultural impacts; 17 studies discussed environmental impacts; and 15 studies discussed economic impacts. The results show native plant-based foods from the six different regions of Australia—Western Australia, Northern Territory, South Australia, Queensland, New South Wales and Victoria. The earliest publication date was 1987, with the most recent published in 2022. In terms of methods, more than half of the studies (53%) used experimental study designs such as in vitro and in vivo studies and crop experiments; fifteen studies (26%) were review studies; seven (12%) used field data collection such as observations, interviews, and surveys; four (7%) were case studies or case analysis; and four (7%) used different sources such as tables of nutritional composition, documentary sources, ethnobotanical, ethnohistoric, and ethnographic databases. Most of the studies (70%) studied one or more specific Australian native plant-based food or groups of food, and seventeen studies (30%) described Australian native plant-based foods in general.

### 3.3. Social, Environmental, and Economic Impacts

Figure 3 summarises the social, economic, and environmental impacts of Aboriginal food practices and Australian native plant-based foods on sustainable food systems.



**Figure 3.** Sustainability in Aboriginal food systems. Source: Adapted from Nguyen, 2018 [20]. This image was adapted under the CC BY-NC-SA 3.0 IGO license. © 2018 Food and Agriculture Organization of the United Nations [20].

### 3.3.1. Social Impacts

The social impact analysis was separated into three subcategories: nutritional benefits, health benefits (Table A3), and cultural benefits (Table A4) of Aboriginal food practices and Australian native plant-based foods.

#### Nutritional Benefits

The traditional Aboriginal diet showed diversity, including more than 300 different species of fruits and vegetables, 150 varieties of roots and tubers, and various seeds and nuts [32].

The food was minimally processed, avoiding loss of nutrients [32,33]. Processing, such as grinding seeds, cooking, and leaching nuts, was performed only to make foods more digestible, palatable, edible, and for detoxification [32–34].

Many Australian native plant-based foods are more nutrient-dense when compared to the equivalent variety of traditional or “Western” foods [35]. The main source of carbohydrates were tubers [32,36], and seeds from different species [37–41]. Chong et al. [37] found a variation from 65 to 75% of carbohydrates in three species of *Acacia* seeds—*A. cyclops*, *A. microbotrya*, and *A. victoriae*. Among the fruits, bush tomato (*Solanum centrale*) and Tasmanian pepperberry (*Tasmanian lanceolata*) stand out, with 47 g/100 g fresh weight (FW) and, 34 g/100 g dry weight (DW), respectively [35].

Many Australian native foods are richer in protein than similar conventional non-native crops such as yam (*Dioscorea transversa*) [32], Australia native rice [42], Pindan walnut [29], *Acacia* seeds [33,36–40], green plum (*Buchanania obovata*) [43,44], and Bush tomato (*Solanum centrale*) [35]. According to Adiamo et al. [39], *Acacia bilimekki* has 35.5% protein. Some native fruits are also high in protein. Riberry (*Syzygium*) has 8.1 g/100 g FW and bush tomato 10.3 g/100 g FW, while the average protein levels in Western fruits is 0.73 g/100 g [35]. In addition, some native foods contain high amounts of essential amino acids [38,40,45]. For example, some *Acacia* seeds have high levels of histidine, lysine, valine, isoleucine, and leucine [38]. However, methionine was a limiting amino acid found in these seeds [38]. Davidson’s plum, finger lime, and native pepperberry also have some essential amino acids such as cystine, histidine, isoleucine, and lysine [45].

Some studies also highlighted the content of fat in some native foods [29,38,41,46,47], such as *Eucalyptus pachyphylla* seeds, with 41.5 g/100 g [41]. The benefits of the fatty acid profile are also stressed by some authors, for example, some species of *Acacia* seeds, in which oleic acid was the predominant fatty acid [38] and the good n-6/n-3 PUFA ratio in some halophytes [46].

Many studies show that native foods are also rich in fibre [32,33,35–38,44,48]. A study by Chong et al. [37] shows that *Acacia microbotrya* species has 49.2% fibre. Another study by Dissanayake et al. [35] reported that some Australian native foods have higher fibre content compared with Western fruits, for which the average is of 2.9 g/100 g, such as bush tomato (*Solanum centrale*), with 7.8 g/100 g FW; Kakadu plum, with 7.1 g/100 g FW; finger lime (*Citrus australasica*), with 7.2 g/100 g; and Tasmanian pepperberry (*Tasmanian lanceolata*)—41.9 g/100 g DW.

Australian native plant-based foods are rich in vitamins and minerals such as zinc, iron, calcium, magnesium, manganese, phosphorus, potassium, selenium, sodium, folate, vitamin A, vitamin B, vitamin C, and vitamin E [32,33,35–38,42–44,46–48]. Sesame seeds (320 mg/100 g) and almonds (283 mg/100 g) are among the highest recognised magnesium-rich foods [41]. However, Nangala et al. [41] found an amount of 501 mg/100 g in *Eucalyptus pachyphylla* F. Muell (*Myrtaceae*) seeds. Iron, for which the recommendation is 8 mg/day RDA [47], was another mineral reported in some different foods, such as *Acacia* seeds [36–39], yams [32], green plum seeds [43,44], and wild peaches, with 11 mg/100 DW [47]; bush tomato (*Solanum centrale*), with 2.9–9.3 mg/100 g FW; finger lime (*Citrus australasica*), with 5.48 mg/100 g FW; and Tasmania pepperberry (*Tasmanian lanceolata*), with 4.8/100 g FW [35].

The recommendation of vitamin C is 45 mg/day, and orange is one of the greatest sources, with 52 mg/100 g [35]. Many studies stress the high content of vitamin C in Kakadu plum, making it the greatest source of vitamin C in the world [32,49–51], reaching 7000 mg/100 g FW [35]. Among Western fruits, the vitamin E average content is 0.3 mg/100 g, and cherry tomato is about 0.2 mg/100 g, while the content in some native fruits is much higher, such as quandong (*Santalum acuminatum*), with 0.7–4.78 mg/100 g DW; bush tomato (*Solanum centrale*), with 4.57 mg/100 g DW; and Kakadu plum (*Terminalia ferdinandiana*), with 6.08 mg/100 g DW [35].

The total phenolic content (TPC), one of the components responsible for the antioxidant activities in some native foods, was also reported in *Terminalia carpentariae*—wild peach [47], *Terminalia ferdinandiana* [51], and different finger lime species [52].

### Health Benefits

Table A3 shows numerous possible health benefits from Australian native plant-based foods, including antidiabetic properties, anticancer activities, antimicrobial and antifungal activities, and the promotion of emotional wellbeing and food security.

Australian native tubers, seeds, roots, and fruits may contain nutrients with ‘antidiabetic’ properties. Some studies show that due to their composition being high in fibre, having more resistant starch (more amylose than amylopectin) [33,53–55], and having some phenolic compounds [35], these foods have a low glycaemic index, low insulin responses, and inhibitory effects on enzymes linked to carbohydrate digestion. Thorburn et al. [53,54], in their two studies analysing the digestibility and metabolic responses of native foods, found that some foods such as cheeky yam (*D. bulbifera*), mulga seed (*A. Aneura*), and black bean (*C. australe*) had a significantly smaller postprandial glycaemic index than Western starches such as potatoes. Njume et al. [55] developed some flakes and crackers with selected Australian native seeds and fruits (*T. orientalis*, *A. longifolia* subsp. *sophorae*—seeds, and *R. candolleana* subsp. *Candolleana*—berries), and the results showed that these foods were classified as having a low glycaemic index. The authors link the antidiabetic properties to their high fibre, resistant starch, and phenolic contents [55]. Another extensive review assessing the literature on the nutritional and therapeutic activities of Australian native vegetables and fruits showed that lilly pilly (*Syzygium paniculatum*), quinine bush and anise myrtle showed inhibitory activities against some enzymes related to carbohydrate digestion, such as  $\alpha$ -amylase and  $\alpha$ -glucosidase, and exhibited antiglycation activities [35].

Fifteen Australian native plant-based foods may be linked to anticancer activities, including lilly pilly (*Syzygium paniculatum*) [35,56], Kakadu plum [35,57], quandong (*Santalum acuminatum*) [57] Davidson’s plum [35,57], Illawarra plum (*Podocarpus elatus*) [35,50,57], *Acacia* seeds (wattle) [39], muntries, native currant (*Antidesma erostre*), native tamarind (*Diploglottis australis*), lemon aspen (*Acronychia acidula*), desert lime (*Citrus glauca*), bush tomato (*Solanum centrale*), green plum (*Buchanania obovata*), riberry (*Syzygium luehmanni*), blue quandong (*Elaeocarpus angustifolius*), and bush cherry (*Syzygium australe*) [35]. These Australian native plant-based foods show the presence of phenolic compounds such as gallic acid, catechin, quercetin, ellagic acid, and vitamin C, which are strongly linked to a reduction in cell viability and antiproliferative and proapoptotic activity against different types of cancer, such as adenocarcinoma, bone osteosarcoma, colorectal cancer, gastric cancer, pancreatic cancer, hepatocellular cancer, cervical cancer, and leukaemia [35,39,50,56,57]. However, saponins from *Acacia ligulate* showed only weak activity against melanoma cancer [58].

Some Australian native plant-based foods, due to the presence of phenolic acids, tannins, flavonoids, and ascorbic acid, showed the potential of antimicrobial properties against Gram-positive bacteria, Gram-negative bacteria, and fungi, such as *Staphylococcus aureus*, *Escherichia coli*, *Salmonella Typhimurium*, *Bacillus cereus*, and *Candida albicans* [35,37,39,44,47–49,59]. The fruits and seeds with these antimicrobial properties were green plum (*Buchanania obovata*) [35,44,59], Kakadu plum (*Terminalia ferdinandiana*) [35,49], gumby gumby (*Pittosporum angustifolium*), [48], *Acacia cyclops* [37], *Acacia* seeds [39], riberry (*Syzygium luehmanni*),

Davidson's plum (*Davidsonia pruriens*), bush cherry (*Syzygium australe*), Tasmania pepperberry [35], and wild peach (*T. carpentariae*) [35,47].

Bioactive compounds from Australian native foods, such as phenolic acids (gallic, m-, and tannin acids), flavonoids (quercetin, catechin, and rutin), anthocyanins, tocopherols, and ascorbic acid are linked to antioxidant activities and potent activities reducing inflammatory enzymes [35,50,56]. Plenty of Australian native foods are linked to antioxidant and anti-inflammatory activities, among them *Carpobrotus rossii* (pigface) [60], native pepperberry [45], *A. acidula* (lemon aspen) [61], *Mentha australis* (Australian native mint) [62], green plum (*Buchanania obovata*) [44,59], *Acacia* seeds (*A. cyclops*, *A. microbotrya* and *A. victoriae*) [37,39,50], Davidson's plum (*Davidsonia pruriens*) [45,63], and Kakadu plum [35,51].

Promoting a healthy gut and microbiota may be other benefits of some Australian roots, tubers [33], and some fruits, such as Davidson's plum (*Davidsonia pruriens*), yellow mangosteen (*Garcinia dulcis*), and purple mangosteen (*Garcinia mangostana*) [35]. Due to the presence of some unabsorbable carbohydrates, and tannins that are metabolised by the gut microbiota and produce other bioactive compounds, these foods can increase healthy bacteria species, decreasing the toxic ones, and reduce inflammatory cell infiltration [33,35,64]. The Queen Garnet plum (*Prunus salicina*) showed no observed direct interactions with gut microbiota but presented inhibitory action on the inflammatory process in some bowel diseases [35]. In addition, traditional Aboriginal diets were rich in vitamins and minerals and had high diversity in gut microbiome populations, which may produce more tolerance to food allergies than the current diets [64].

Native fruits from Australia may also have the potential to prevent weight gain. Phenolic acids extracted from Illawara plum [50], Davidson's plum, yellow mangosteen, and purple mangosteen [35] have been shown to reduce fat mass, adipose cell size, and triglycerides by different pathways in *in vivo* studies, including reducing the pancreatic lipase, improving the liver functions, and regulating the gut microbiota. For example, the garcinol extracted from yellow mangosteen (*Garcinia dulcis*), showed modulatory activity, increasing the antiobesity commensal *Akkermansia* bacterial, which limited the dysbiosis from a high-fat diet [35].

Studies with *Carpobrotus rossii* (pigface) showed that this native food may reduce cardiovascular risk due to the presence of tannins, flavonoids, and 3-hydroxy-3-methylglutaric acid, which decreased atherogenic lipoproteins and platelet aggregation [60,65]. Kakadu plum extracts presented as a potent antioxidant and a promising therapeutic agent against damaged liver by alcohol [51]. Extracts from the fruit improved the activities of alcohol dehydrogenase—ADH and ALDH—two enzymes linked to alcohol metabolism [51].

In addition to the direct health and nutritional benefits of Australian native plant-foods due to their composition, cultural food practices in Aboriginal communities may have indirect benefits to health, such as promoting physical activity, emotional wellbeing, and food security [32,33,66]. Aboriginal communities used to have an active lifestyle that was an energy-intensive process, including walking long distances to procure food, gathering, digging for tubers, and grinding seeds [32,33]. Collecting and eating bush foods were also referred to as actions that can make Aboriginal people from Central Australia happy and relaxed, promoting their wellbeing [66].

Some techniques and cultural food practices used by Aboriginal people may be related to food security, making foods safe to consume, eating together, sharing food, and minimising food spoilage [34,67–69]. Some studies show that Aboriginal people have the knowledge to prepare seeds and nuts, making them safe to consume [32,34,67,70]. *Cycad* seeds were prepared using three different methods to remove toxic compounds, such as cycasin—a known carcinogen [32,67]. They used to have a brief process of leaching, roasting, drying, and leaching the seeds overnight in running water. Another method was putting the seeds into a prolonged process of leaching, drying, leaching in running water from 3 days to 5 months, and then roasting. Moreover, the women used to collect seeds from the ground, dividing them into two groups, edible and inedible, based on their smell and how easily or hardly the seeds were crushed [67]. Experiment tests showed that these



Aboriginal methods were efficient at reducing or eliminating the toxic cycasin [67]. During dry seasons, when easier food sources were not available, seeds were probably the most important source of food for Aboriginal communities. The seeds were ground, pounded, and smashed using different stone tools, and the dough was eaten raw or baked in the ashes of a fire [70]. Sharing food and eating together are part of Aboriginal culture [68,69]. In the end of the day, after gathering the food, the bulk was taken back to the main camp for cooking and eating with the band. Elders controlled the distribution, which was based on age, gender, and kinship obligations [68]. In addition, Aboriginal people used the Earth oven cooking method, which involves putting food within a pit and using heat-conducting elements, such as stones or clay nodules, and wrapping the food within layers of plant material and cooking it for a long period [69]. Earth ovens helped with large-scale cooking, minimising the possibility of spoilage of abundant foods from the season, in part increasing the energy density, digestibility, and palatability of starches, and reducing toxins [69]. Ferguson et al., in a recent study with Aboriginal people in Australia, also showed that 40% of food-insecure Aboriginal people reported consuming a variety of native plant-based foods to alleviate food insecurity, such as yams, berries, and cashew tree nuts, as they are considered to be a low-monetary source of sustenance [71].

### Cultural Benefits

Table A4 shows the high social-cultural value of Australian native plant-based foods and Aboriginal food practices. In many Aboriginal groups, these foods are often linked to a spiritual connection with ancestors and nature [68]. For example, Aboriginal women from the Kimberley region have a strong spiritual connection with bottle trees, also called baobab—*Adansonia gregorii*, a native species that provides edible pith, seeds, and roots for these communities [72]. Likewise, in Northern Territory, *Cycas arnhemica* has spiritual and nutritional significance to some Aboriginal groups [73]. Moreover, some native foods are used in traditional ceremonies and rituals by Aboriginal communities, such as the seasonal production of edible nuts (*Araucaria bidwillii*—bunya pine), which enable Aboriginal groups to gather for feasts and ceremonies [74], and the common practice of singing traditional songs while grinding and threshing native grains in some communities [70].

Aboriginal food practices and native foods are also linked to identity. Eating together is a habitual practice in Aboriginal communities that represents their social organisation and an opportunity to express their identity [69]. According to Holcombe et al. [66], who investigated the self-motivated work by central Anmatyerr people in Northern Territory to sell bush tomatoes, one of the reasons was that harvesting together is considered a reinforcement of their identity. Other authors highlighted that incorporating Aboriginal knowledge in harvesting bush foods, such as Kakadu plum and Australian native rice, can be recognised as a culture-based economy [42,75].

For Aboriginal people, native food and traditional practices can also be a vehicle for the repatriation of knowledge, for example, using a seasonal calendar and fire techniques to revitalise Aboriginal knowledge about food cultivation [76]. Harvesting native food together is a way to legitimise and transmit traditional knowledge from one generation to another [66]. For example, Sharon Winsor, who has her own business selling native plant products, obtained her knowledge about native foods from her mother [77]. In addition to the cultural benefits mentioned before, many Australian native plant species used to be a source of food, medicine, and material to produce different tools for Aboriginal people [74,78].

### 3.3.2. Environmental Impacts

Australian agriculture and food production is at risk from climate change, which must be addressed by changing cultivation practices to make more sustainable use of natural resources like water and soil [79]. Table A5 shows the numerous environmental benefits from Aboriginal food practices and Australian native foods, such as their promotion of plant, water, soil, and animal health [32,68,70,74,76,80–82], the environmental stress

tolerance linked to native foods [36,42,78,79,83,84], ecosystem services [70], and a reduction in food waste [32].

Aboriginal principles and values are considered direct benefits to the environment, as their culture has a spiritual connection with respect for natural resources [82]. For Aboriginal communities, spirit ancestors created plants, animals, and people, and everything is alive and interrelated. Spiritual and physical worlds interact, and past, present, and future are one [68]. Due to these values, Aboriginal communities have the knowledge and some practices to promote a healthy ecosystem. The time to cultivate and harvest foods is based on different ecosystem components and their interrelationships, such as astronomy, weather, landscape, animal behaviour, and plants, currently represented by seasonal calendars [68,82]. Moreover, they use ecological land management [76] and move to other locations before depleting the soil [68,82].

Manipulating the environment was another strategy used by Aboriginal communities to protect natural resources and guarantee food supply. Work conducted by Ens et al. [74] reported three different forms of ecosystem manipulation by Aboriginal people: species relocation, burning, and water management. A notable example given by the authors is the cultivation practices Aboriginal people use to maintain the genetic diversity of yam daisy species, improve tuber reproduction, and increase soil nutrients. These practices include burning, digging the soil, and removing the basal part of yams, keeping the top portion during harvesting. Jones and Clarke [68] also mention replanting undersized tubers and plant fragments to improve plant growth. Lullfitz et al. [81] used an Aboriginal technique to harvest tubers and tested the implication to the plant and soil. The results showed increased soil sulphur and potassium levels and plant abundance, but decreased tuber volume and mass. However, the authors stressed that the method was used two years after initial harvest, instead of being a four-year interval between harvests, as the Elders advocate, which can be one of the reasons for the decreased tuber volume and mass. Fruits were also harvested using protocols, such as taking portions and not whole crops, not breaking plant limbs, and not damaging unripe fruits [74].

Burning is a practice used by Aboriginal people that contributes to seed germination, grass health, biodiversity [32,74,76], and prevention of destructive fires during summer [73,80]. After burning, more native plants grow and more animals come through [76]. Wetland management was essential to the survival of plants and animals in the arid zone of Central Australia [32,74]. Aboriginal people used to construct waterholes, weirs, ponds, traps, diversions, and flood-on areas to regulate water flows and influence aquatic and plant resources [32,74].

Identifying and limiting non-native species' spread was another environmental manipulation used by Aboriginal people to protect natural resources, in this case, native plants [73].

Reduction in food waste may also be linked to the environmental impacts of Aboriginal food practices, as their food consumption was seasonal-based, and the food was consumed at the time it was available, and so it was less likely to be wasted [32].

In addition to these Aboriginal food practices, Australian native plant-based foods are found to be environmental-stress-tolerant. These plants are tolerant to heat [42,79], salinity [42,78,83], drought [42,78], have adapted underground structures to survive in hard conditions [84], and are resistant to diseases [42]. A recent study by Pattison et al. [84] reported that bush tomatoes have adapted underground structures to survive in hard conditions, such as ephemeral roots, starch storage, and ease of resprouting. Salinity tolerance was reported in wild rice species [42], in native muntries [83], and in *Myoporum* species [78]. Another study by Njume et al. [36] argues that the higher mineral and total phenolic content concentrations in some native fruits, seeds, and tubers may be due to the hard environmental conditions. Some native grasses can also provide ecosystem services such as carbon sequestration, water supply, flow regulation, pollination support, and erosion control [70].

Transmitting this traditional knowledge is also important to Aboriginal communities, as shown in a study conducted by Holcombe et al. [66] who investigated the reasons for harvesting bush foods. The study participants argued that harvesting and eating native foods is a way to transmit traditional ecological knowledge.

### 3.3.3. Economic Impacts

Table A6 shows the economic benefits of Aboriginal food practices and Australian native plant-based foods. Some food cultivation techniques were used for Aboriginal communities to guarantee food supply. The use of firestick farming facilitates the germination of seeds, providing a rich starch resource during dry seasons [32,80], and prevents fires from killing the yam crop in hot seasons [80]. Likewise, native grasses were a source of food supply in dry seasons [70]. To ensure the yams would grow in the next year, community members used to plant them on off-shore islands and kept them attached the top of the tuber to the tendril of the vine, and the rest of the tuber was dug out [32]. Jones and Clarke [68] also mentioned the use of replanting undersized tubers to encourage their growth. Drying some foods and preparing cakes after gridding and cooking seeds or nuts was a way to allow food storage [32]. The current use of the seasonal calendar in some communities is a way to transmit this knowledge for next generations [82].

The environmental stress tolerance and quality of some native foods contribute to their commercialisation [42]. For example, Australian wild rice species are found to have excellent grain quality attributes such as milling and cooking/eating, as well as nutritional value [42]. Across Australia, more than 40,000 native food enterprises operate, with some foods having a high farm gate value, such as Kakadu plum, with an estimated annual farm gate value reaching 240 K; and bush tomato, with 540 K [79]. There are thirteen main plant species that are part of the Australian native bush food industry, namely, Davidson plum (*Davidsonia* species), anise myrtle (*Backhousia anisata*), elegant wattle seed (*Acacia victoriae*), lemon myrtle (*Backhousia citriodora*), bush tomato (*Solanum centrale*), riberry (*Syzygium leuhmannii*), Kakadu plum (*Terminalia ferdinandiana*), desert lime (*Citrus glauca*), muntries (*Kunzea pomifera*), lemon aspen (*Acronychia acidula* and *A. oblongifolia*), finger lime (*Citrus australasica*), mountain pepper (*Tasmannia lanceolata*), and quandong (*Santalum acuminatum*) [68]. The bush food industry involves wild harvesting, growing, processing, value adding, tour business, and catering [68]. Some Australian native foods have been added to gourmet market, such as carrots from *Adansonia gregorii* (baob) in salads [72]. Another study by Hay et al. [85] reported that some native foods can be used by the food industry to make natural additives. For instance, the native currant (*Canthium latifolium*), a bright red fruit, is being suggested as a potential nonsugar sweetener and red colouring source, and *Dianella revoluta* has a natural source of blue colouring [85]. Likewise, Richmond and Ghisalberti [78] found that *Myoporum* species, also known as sugarwood, an important food resource in some communities, may be a commercial source of mannitol.

The potential market of native foods offers job opportunities for Aboriginal people who have the traditional ecological knowledge to cultivate and prepare these foods [75]. Aboriginal communities apply their knowledge to add value to raw products, such as in the postharvest treatment of some fruits and adding information about the plant use [73]. This value-adding process can provide additional jobs for Aboriginal communities, incorporate cultural knowledge, and attend the market's requirements [73]. A notable example is the growing Kakadu plum production, which is supported by Aboriginal corporations, such as the Thamarrurr Rangers group in Northern Territory, who hosts a Kakadu plum enterprise, applying their knowledge in managing the fruit and linking with markets [75]. Another example is a case study performed by Logue et al. [77], which shows a social entrepreneur led by an Aboriginal woman in New South Wales, Sharon Winsor, who learned her traditional knowledge of harvesting native foods and applied it to develop and sell some products such as Davidson plum syrup and lemon myrtle sweet sauce. Communities across Central Australia said that one of the reasons to work with bush tomato, a part of the cultural importance already reported, was the source of income [66].

### 3.4. Challenges for Including Australian Native Plant-Based Foods in the Current Food System

Table A7 shows the challenges for including Australian native plant-based foods in our current food systems. Studies showed issues around environmental, economic, processing, cultural, and toxicological properties, which could be a challenge to including Australian native foods in the current food system [35,42,46,68,82,85]. For some native species, there is a lack of knowledge about agronomic protocols, stability under different harvesting, storage, processing, packaging, and transportation conditions [35,42], and a lack of information about the nutritional composition in some foods, such as the vitamin profile in muntries (*Kunzea pomifera*) [35] and the composition of fatty acids and amino acids in Australian Pindan walnut [29]. Studies also report the lack of in vivo and clinical studies to better understand the bioavailability, antinutritional components, and potential toxicity components of some native foods [29,35,38,44,63]. Several species have antinutritive or toxic residues [33,85], such as *Acacia* seeds, which can be reduced or eliminated by heat treatment [37,39].

Some native species reported environmental challenges such as the difficulty of controlling pests and bacteria, even with disease-resistant properties [42]. Akter et al. [51] analysed antioxidant extracts in some native plums, and also mentioned that different environmental conditions can affect the presence of secondary metabolites in these fruits. High salinity in the environment can also increase the salt content in some species, making their sodium content higher than the intake recommendations [46]. According to Jones and Clarke [68], climate change is another challenge, as some Aboriginal communities have had their lands affected by land erosion and invasive plants. Restrictive controls by the government also deny the right to apply their ecological knowledge, such as burning to mitigate the threat of damaging fires and improve the growth of native species [68]. Also, the lack of financial support is a barrier to the successful development of Aboriginal businesses that work with native foods [68].

Processing some native species is time-consuming due to their structure, such as the very long awn, lemma, and palea, which enclose the grains of Australian *Oryza* species [42], and the varying levels of harvesting and processing before consumption of some tubers [81]. Nangala et al. [41] and Drake et al. [70] showed seeds' slow harvest and preparation rates, making this species difficult to include in the commercial bush foods industry. Processing some native foods in the industry also has some barriers, such as extracting natural food additives, which have lower stability during thermal processing, light sensitivity, and pH change [85].

Cultural challenges are also mentioned by some authors. The food industry and research must improve protocols to attend legal responsibility to ensure Aboriginal communities are recognised and involved in all processes [73,75,85]. Relocating some native species to different geographic locations to cultivate may not be culturally viable, as they are linked to the Country and dreaming for communities [79].

## 4. Discussion

This scoping review demonstrates that Aboriginal food practices and Australian native plant-based foods make an important contribution to sustainable food systems through social, economic, and environmental impacts. Several studies reported the nutritional and health benefits of the traditional Aboriginal diet, including diversity and nutritional composition. Australian native plant-based foods have important nutritional properties, such as being high in antioxidant and anti-inflammatory compounds and having a potential effect reduction in diabetes and cardiovascular risk, and they may be linked to some anticancer activities. Additionally, Australian native foods have significant cultural benefits linked to spiritual connection and identity in Aboriginal communities. The economic impacts include improving food supply, the potential market for Australian native plant-based foods, and job opportunities for Aboriginal people. Furthermore, our findings showed some environmental impacts, such as ecosystem benefits, and the environmental stress tolerance of some native species, such as heat, salinity, and drought tolerance. However,

the results also demonstrated some challenges such as a lack of clinical trials, toxicity, anti-nutritive components, and some limitations to knowledge around how to process Australian native plant-based foods.

Our results indicate several health and nutritional benefits from Aboriginal food systems. A similar study by Akinola et al. [86] investigating Indigenous food crops in Africa and their implications for more sustainable and healthy food systems, calling them “super foods”, showed the potential of native foods to address gaps in nutrition and face the reduction of chronic diseases, due to their nutrient density, such as protein, vitamins, and minerals. Studies in America also found the importance of native foods for food diversification and to combat chronic diseases [23,87–89].

Furthermore, our findings suggest that Australian native plant-based foods have an important cultural role in Aboriginal communities due to their connection to the Country and identity. Similarly, in a recent study, Fatima et al. [90] investigated the relationship between “caring for Country” activities and improvements in the social and emotional wellbeing of Indigenous people in Australia and New Zealand. The authors found that “caring for Country”, including harvesting bush foods, was associated with improved emotional wellbeing, and strengthened the relationship with the Country. Christidis et al. also [91] showed in their study that participants associated bush foods with their identity, culture, and healthy diet. Another study by Schultz et al. [92], applying focus groups and interviews in Aboriginal communities, identified that participants highlighted that Indigenous land management and access to traditional foods strengthened identity and empowerment. The use of edible seeds, predominantly acacias and grasses, in women’s ceremony songs is another notable example of the importance of edible native foods for some Aboriginal communities [93].

Enabling cultural rights to food sovereignty for Aboriginal communities is essential as a movement that challenges the current neoliberal food system, which marginalises and removes Indigenous people from their land [94]. Indigenous food sovereignty is the ability of Indigenous communities to make decisions about their harvesting practices and the connection with the land and have access to culturally appropriate and healthy foods [95]. Even though there is an increased emphasis on the importance of Indigenous knowledge for food system transformation in academic research, it has been marginalised in institutions and decision-making processes [96]. Browne et al. [24] showed that Aboriginal people have submitted recommendations related to self-determination, food insecurity, social determinants in health, and culturally appropriate approaches to health to food and nutrition policy development. However, the authors found that few Aboriginal organisations have participated in this process, Aboriginal people were not included in any committees, and the key recommendations were underrepresented in the final policy [24].

Our review showed the environmental impacts of Australian native foods and Aboriginal food practices, including manipulation of the environment to protect natural resources and the environmental stress tolerance of native foods. We found that Aboriginal principles and values directly benefit the environment due to their respect for natural resources. This finding is consistent with Sveiby et al. [97], who investigated Aboriginal principles for sustainable development. While analysing Aboriginal law stories and interviewing members of different Aboriginal communities, it was significant to note a contrast between dominant Western paradigms, where humans have dominion over nature [97]. Aboriginal communities have the ecological principle of keeping a balance between all living things, and it is associated with social principles that can benefit the environment, such as respect, collaboration, community building, and care [97]. This study also highlights that we will not return to a nomadic life, but we can apply these principles nowadays for a sustainable world [97]. A group of respected Elders, Indigenous scholars, and environment defenders around the world, guided by the necessity of Indigenous peoples’ sovereignty to face climate change, define the determinants of planetary health from an Indigenous perspective, which also includes respect for Mother Earth, the human interconnectedness within nature and the self, and community relationships [98].

Findings from this review also indicate that native Australian plant-based foods may be a good option to address climate change, as they have environmental stress tolerance, such as drought tolerance, and can be helpful for carbon sequestration. Bruce Pascoe [99] also supports that native plants from Australia are essential to face climate change, as they are adapted to Australian soil, do not require fertilisers and pesticides, and can sequester carbon. Pascoe explains that if only five percent of our agriculture uses native foods, we could meet the carbon emission reduction targets [99].

Furthermore, we identified the economic impacts of Australian native plant-based foods and Aboriginal food practices, including their potential market, job opportunities for Aboriginal communities, and some practices to guarantee food supply.

A report published by the Northern Territory Government, using an extensive consultation with different stakeholders, determined the economic potential of the bush foods and medicine industry in Central Australia [100]. The report shows that this industry has the potential to provide social and economic benefits to local communities, and the most traded foods were bush tomatoes, wattle seeds, and quandong. However, the bush foods and medicine industry is small and immature, and training and infrastructure are needed to support their growth [100].

Dark Emu, a best-selling book by Bruce Pascoe [101,102], describes the use of sophisticated technologies by Aboriginal people to live, farm, and manage the land to guarantee their food supply. The author examined the journals of early explorers and found descriptions of large-scale agriculture, such as large quantities of harvested grain and massive fields of moon tubers in Western Australia. However, there is controversy over Aboriginal agriculture, as some authors who have challenged Bruce Pascoe argue that Aboriginal people were hunter-gatherers and they did not adopt agriculture [103]. One of the criticisms to Pascoe's discussion is the judgmental assumption that hunting and gathering are primitive and less sophisticated than agriculture [103]. Jared Diamond, on the other hand, argues that Australia, due to its geographical and environmental factors such as dry and infertile soil and small number of domesticated wild plants, was not fit for agriculture [104]. For Diamond, hunter-gatherer culture used by Aboriginal people was the most rational adaptation [104]. The ongoing debate illustrates that the understanding and categorisation of Aboriginal food systems, especially growing and harvesting practices, is still an area of controversy, and future research and histories will be important in uncovering the depth and nuances of this critical area.

## 5. Conclusions

Findings from our review suggest that Aboriginal food practices and Australian native plant-based foods have great potential to make our food systems more sustainable. However, including these foods in the current food system has many challenges that can be addressed with more investment and research in this area, led by Aboriginal communities and their aspirations. Investments in Aboriginal food practices and Australian Native plant-based foods, recognising Indigenous voices and perspectives, are a pathway towards a more resilient, equitable and culturally appropriate food system. Moreover, integrating Aboriginal knowledge into research and food policies can contribute to a more inclusive food system and achieve international sustainability targets such as the Paris Climate Agreement and United Nations' Sustainable Development Goals.

### 5.1. Limitations

Despite our efforts, this scoping review has some limitations. First, there are many more studies related to nutritional and health impacts than cultural, environmental, and economic impacts, which could have some bias from the search strategy utilised, which used more key words related to health and environment in the group of sustainability in food systems. The term sustainability in food systems is complex, and the search strategy used in this scoping review did not include each aspect of sustainability in food systems, such as carbon footprint, food supply, job, and income. Although we tried to use as many

search terms as possible, the research question is broad, and it is possible that we missed some important studies. Furthermore, the included studies were heterogeneous in terms of design and methodology, which was a challenge to extract and summarise the results. Finally, according to the scoping review guidelines, we conducted no quality analysis of the papers, which may affect the paper selection and data extraction.

## 5.2. Recommendations

Our scoping review has shown a rich foundation of literature around the sustainability in Aboriginal food systems. These must be supplemented with more research to respond to the challenges of including Australian native plant-based foods in the current food system, which incorporate protocols to cultivate, process, and store these foods and more nutritional and toxicological analysis. Researchers should also consider more studies, applying different methodologies to show the environmental impact of native plant-based foods, such as analysing soil, water, air, and plants' composition comparing native species to non-native species. More studies are also needed to understand the Australian native food market, its barriers and facilitators, and how to introduce these potential foods in the current food system and diets in urban and remote areas. For future research, we also recommend studies including successful initiatives and projects incorporating Aboriginal food practices and native plant-based foods, and studies evaluating the current policies in Australia and their implications to include these foods in our food system. The authors also highlight the challenge and the importance of discussions around how to include, on a large scale, Australian native foods in our current food system without losing their cultural meaning and benefits, as found in this scoping review. Finally, we recommend that research, policies, and the food industry should have protocols to ensure that Aboriginal communities are involved in all steps, making their aspirations recognised and considered when making decisions.

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## Appendix A.

Table A1. Search strategy used in the databases.

Group	Keywords
(a) Indigenous food systems and native plant-based foods	('Aboriginal foods' OR 'bushfood' OR 'native food' OR 'wild edible plants' OR 'traditional food' OR 'agriculture' OR 'horticulture' OR 'crop production' OR 'agrobiodiversity' OR 'agroecology' OR 'indigenous food systems' OR 'cultural food systems' OR 'traditional knowledge' OR 'ITFC' OR 'plant-based food diversity' OR 'traditional learning style' OR 'dietary diversity' OR 'gardening' OR 'urban garden' OR 'home garden' OR 'fruit and vegetable consumption' OR 'food access' OR 'food')
(b) Australian territory	((Australia OR 'northern territory' OR Tasmania OR 'New South Wales' OR Victoria OR Queensland OR 'South Australia' OR 'Western Australia') AND (aborigin* OR indigenous OR 'torres strait islander') (diet OR 'global health' OR 'planetary health' OR sustainability OR 'sustainable diet*' OR 'sustainable development goal*' OR 'food system*' OR 'environmental footprint*' OR 'cropland footprint*' OR 'climate change' OR 'pesticide footprint*' OR 'water footprint*' OR nutrition OR 'health eating' OR 'food environment' OR 'dietary diversity' OR 'plant-based food diversity' OR 'food access' OR agriculture OR 'plant-based' OR food OR 'food security')
(c) Sustainability in food systems	

Table A2. Characteristics of included studies.

Reference/Year	Objectives	Method	Native Plant-Based Food Discussed/ Food Practices	Origin	Impacts Discussed
Thorburn, Brand, and Truswell [54], 1987	Compare the digestibility and metabolic responses of Western foods and traditional staples of Australian Aborigines and Pacific islanders who show a susceptibility to develop diabetes.	In vitro and in vivo studies	Some traditional roots, tubers, nuts, and seeds (e.g., <i>Dioscorea transversa</i> —long yam, <i>Acacia coriacea</i> —desert oak)	-	Social
Thorburn, Brand, Cherikoff et al. [53], 1987	Examine the effect on lowering plasma glucose and insulin responses of wheat bread with <i>Acacia coriacea</i> .	Laboratory method for carbohydrate estimation and in vivo study	<i>Acacia coriacea</i>	-	Social
O'Dea [32], 1991	Describe the traditional diet and food preferences of Australian Aboriginal hunter-gatherers.	Compilation of various sources	Food cultivation, preparation, and consumption of plant foods (e.g., yam, native millet, <i>Terminalia ferdinandiana</i> , etc.)	Northern Australia	Social, environmental, and economic
Beck [67], 1992	Document the range of <i>Cycas</i> processing techniques used by Australian Aboriginal people in the last 200 years and investigate the toxic substances after these preparations. Compile the uses of <i>Myoporum</i> species and outline the potential of the genus in horticulture and as source of phytochemicals. Calculate the average nutrient composition of Aboriginal plant foods and identify the differences between these and modern cultivated foods.	Case study using field observations and laboratorial analysis	<i>Cycad</i> palm ( <i>Cycas angulata</i> )	Northeast Arnhem Land	Social
Richmond and Ghisalbert [78], 1995		Review	<i>Myoporum</i> species ( <i>Myoporaceae</i> )	Coastal and Central Australia	Social, environmental, economic
Brand-Miller and Holt [33], 1998		Using tables of composition of Australian Aboriginal foods	Some traditional plant-based foods (e.g., <i>Acacia</i> seeds)	Western desert	Social
Adewusi, Falade, and Harwood [40], 2003	Analyse the nutritional composition of <i>Acacia tumida</i> and <i>Acacia colei</i> .	Experiment (laboratory method used)	<i>Acacia Tumida</i> and <i>Acacia colei</i>	Northern Western Australia	Social
Hill and Baird [80], 2003	Describe the carbohydrate resource management through fire by Kuku-Yalanji Aboriginal people in wet tropics of Northeast Australia.	Unstructured interviews, field collection, and documentary sources.	Three sources of staple carbohydrate: two species of <i>Dioscorea</i> (yams), and rainforest seeds ( <i>cycas</i> ) <i>Terminalia Ferdinandiana</i> Excell (Kakadu plum), <i>Dioscorea transversa</i> R.Br (long yam), <i>Nelumbo nucifera</i> (lotus lily), and <i>Cycas Arnheimica</i>	Northeast Australia	Economic, environmental
Gorman, Griffiths, and Whitehead [73], 2006	Describe a ranking of commercial potential of native plant species in Northern Territory based on ecological, marketing, cultural, and logistical criteria.	Ethnobotanical database reviewed by relevant community representatives	<i>Dioscorea transversa</i> R.Br (long yam), <i>Nelumbo nucifera</i> (lotus lily), and <i>Cycas Arnheimica</i>	Northern Territory	Social, environmental, economic
Tan et al. [50], 2010	Examine the Australian Aboriginal contribution to the ethnobotanical approach to the discovery of novel phytochemicals for preventing diseases.	Brief review	Some native plant-based foods (eg. Kakadu plum, Wattle seeds, Illawarra plum)	Northwestern Australia to eastern Arnhem land.	Social
Done [72], 2010	Describe the <i>Adansonia gregorii</i> and its importance to culture of the Indigenous people.	Brief review	<i>Adansonia gregorii</i> (baob)	Kimberley region	Social and economic
Cock and Mohanty [49], 2011	Evaluate the antibacterial activity and toxicity of Kakadu plum fruit extracts.	Experiment (laboratory method used)	<i>Terminalia ferdinandiana</i> (exell) fruit—Kakadu plum	Northern Territory	Social
Geraghty et al. [60], 2011	Investigate the antioxidant, antiplatelet, and anti-inflammatory activity of <i>Carpobrotus rossii</i> (pigface) leaf extract.	In vitro study	<i>Carpobrotus rossii</i> (pigface)	Southern coast of Australia	Social



Table A2. Cont.

Reference/Year	Objectives	Method	Native Plant-Based Food Discussed/ Food Practices	Origin	Impacts Discussed
Holcombe, Yates, and Walsh [66], 2011	Examine an alternative economy in the Anmatyerr region of central Australia, analysing the self-motivated work by central Anmatyerr people to sell Katyerr (desert raisin, Bush tomato).	Field visits to record harvest locations and discuss harvesters' motivations	Bush tomato	Central Australia	Social, environmental, and economic
Prober, O'Connor, and Walsh [82], 2011	Characterise the potential and contemporary application of Australian Aboriginal ecological calendars to natural resource management.	Review	Species traditionally used provided by calendars (e.g., yams, bush tomatoes, bush oranges)/food cultivation	-	Social, environmental, and economic
He et al., 2012 [105]	Investigate the antiangiogenic effects and its mechanisms of zerumin A from <i>Alpinia caerulea</i> .	Experiment (laboratory method used with zebrafish model)	<i>Alpinia caerulea</i> (R.Br.) Bentham—a perennial herb	Tropical and subtropical Australia	Social
Walton and Weir [64], 2012	Compare the traditional Aboriginal versus modern Western diets, and examine the connection between diet and the common allergies experienced by Indigenous Australians.	Review	Plant foods (not specific ones)	-	Social
Epifano et al. [61], 2013	Examine the phytochemistry and pharmacognosy of the genus <i>Acronychia</i> .	Review	<i>A. acidula</i> (lemon aspen)	North of Queensland and New South Wales	Social
Pirie et al. [65], 2014	Determine whether consumption of crude leaf extract from <i>Carpobrotus rossii</i> (pigface) affects lipoprotein profile, resting glucose, systolic blood pressure, and vascular function, and whether it produces toxic effects in healthy rats.	In vivo study	<i>Carpobrotus rossii</i> (pigface)	-	Social
Tuechler, Ferrier, and Cosgrove [34], 2014	Analyse the nutritional returns from Aboriginal nut processing in Queensland's Wet Tropics.	Experimental processing and chemical analyses	Yellow walnut ( <i>Beilschmiedia bancroftii</i> ), black walnut ( <i>Endiandra palmerstonii</i> ), black pine nut ( <i>Sundacarpus amara</i> ), and black bean ( <i>Castanospermum australe</i> )	Tropical rainforest region of Northeast Queensland	Social
Vuong, Hirun, Chuen et al. [56], 2014	Investigate the physicochemical and antioxidant properties of the crude fruit extract of lilly pilly, identify its bioactive compounds, and assess its potential antiproliferative effect on pancreatic cancer cells.	Experiment (laboratory method used)	Lilly pilly ( <i>Syzygium paniculatum</i> )	Eastern Australia	Social
Vuong, Hirun, Phillips et al. [57], 2014	Analyse the correlation between bioactive components from Australian native fruits and their therapeutic efficacy against pancreatic cancer.	Review	Some Australian native fruit (e.g., Kakadu plum, quandong, Davidson's plum, Illawara plum)	-	Social
Radulović et al. [106], 2015	Investigate the biological anti-inflammatory, antinociceptive, and antioxidant activity of flower and leaf extracts of <i>Callistemon citrinus</i> —crimson bottlebrush.	Experiment (laboratory method used).	Crimson bottlebrush flowers ( <i>Callistemon citrinus</i> , Myrtaceae).	---	Social
Mathew, Lee, and Race [79], 2016	Examine the prospects for sustaining native bush food production in Central Australia under a changing climate.	Review	Some traditional plant-based foods (e.g., bush tomato, desert lime, quandong, and Kakadu plum).	Central Australia	Environmental and economic
Tang et al. [62], 2016	Evaluate antioxidant capacity of extracts from <i>M. australis</i> R. Br. ( <i>Lamiaceae</i> ) and investigate its phenolic compounds.	Experiment (laboratory method used)	<i>Mentha australis</i>	-	Social
Ferguson et al., [71], 2017	Explore the variety, availability, and frequency consumption of traditional foods and their role in alleviating food insecurity in 20 remote Aboriginal communities.	Semistructured interviews and consumption via a survey	Traditional plant-based foods (e.g., berries, cashew tree fruit, green plum, etc.)	-	Social
Ens, Walsh, Clarke, and Keith [74], 2017	Present Aboriginal plants' uses, management, and production across Australia.	Review	Food cultivation of traditional plant-based foods (e.g., yam daisy species)	-	Social and environmental
Jaeger et al. [58], 2017	Describe the bioassay-guided isolation, structural elucidation, and cytotoxic analysis of the new triterpenoid saponin compounds from the mature pods of <i>Acacia ligulata</i> .	Experiment (laboratory method used).	<i>Acacia ligulata</i>	---	Social
Do, Delaporte, Pagay, and Schultz [83], 2018	Evaluate the salinity tolerance of muntries.	Saline irrigation treatments were tested	<i>Kunzea pomifera</i> F. Muell (muntries)	Costal regions of South Australia and Victoria.	Environmental
Fyfe, Netzel, Netzel, et al. [59], 2018	Determine the components and their functional properties of the green plum flesh and seed.	Experiment (laboratory method used)	<i>Buchanania obovata</i> (green plums)	Western Australia and Northern Territory	Social
Fyfe, Netzel, Tinggi, Biehl, and Sultanbawa [43], 2018	Investigate the nutritional profile of flesh and seed of the <i>Buchanania obovata</i> (green plums).	Experiment (laboratory method used)	<i>Buchanania obovata</i> (green plums)	Western Australia and Northern Territory	Social

Table A2. Cont.

Reference/Year	Objectives	Method	Native Plant-Based Food Discussed/ Food Practices	Origin	Impacts Discussed
Jones and Clarke [68], 2018	Survey Australian Aboriginal culture and its unique food security paradigm and its food practices.	Review	Some traditional plant-based foods (e.g., lemon myrtle, Davidson's plum, etc.)	-	Social, environmental and economic
Logue, Pitsis, Pearce, and Chelliah [77], 2018	Social enterprise to social value chain: Indigenous entrepreneurship transforming the native food industry in Australia.	Case study	Some native plant-based foods such as Kakadu plum and lemon myrtle	-	Social and economic
Zhong et al. [29], 2018	Present the nutritional and phytochemical composition of Indigenous Australian Pindan walnut ( <i>Terminalia cunninghamii</i> ) kernels.	Experiment (laboratory method used)	<i>Terminalia cunninghamii</i> (Pindan walnut)	Northwestern coast	Social
Chong et al. [37], 2019	Determine the nutritional and antinutritional composition of native Australian <i>Acacia</i> seeds.	Experiment (laboratory method used)	<i>Acacia</i> seeds ( <i>A. cyclops</i> , <i>A. microbotrya</i> and <i>A. victoriae</i> )	Western Australia (South West)	Social
Nangala, Napangardi, Napangardi, and Wright [41], 2019	Provide an ethnographic account of harvesting and processing <i>E. pachyphylla</i> seeds and present the nutritional composition of processed flour, and data on seed collection rates.	Interviews, field study, and experiment (laboratory method used)	<i>Eucalyptus pachyphylla</i> F.Muell. (Myrtaceae)	Gibson Desert region of Western Australia and southern Northern Territory	Social
Pattison, Burgess, Bell, and Ryder [84], 2019	Describe the morphology, anatomy, and function of underground structures of Australian bush tomato.	Examined under both laboratory and glasshouse conditions	<i>Solanum centrale</i> J.M.Black (Australian Bush Tomato)	Western Australia, Northern Territory and southwestern Queensland	Environmental
Shelat et al. [38], 2019	Investigate the overall nutritional value and sensory profiling of Australian <i>Acacia</i> species' seeds.	Experiment (laboratory method used)	<i>Acacia</i> seeds ( <i>A. coriacea</i> , <i>A. cowleana</i> , <i>A. retinodes</i> and <i>A. sophorae</i> ).	Northern Australia and Southeastern Australia.	Social
Adiamo et al. [39], 2020	Present a comprehensive review of available literature on the nutritional and health benefits of <i>Acacia</i> seeds, and identify potential uses of <i>Acacia</i> seeds in food formulations.	Review	<i>Acacia</i> seeds (wattle)	-	Social
Fyfe et al. [44], 2020	Analyse the nutritional potential of the native Australian green plum compared to other <i>Anacardiaceae</i> and nuts.	Review	Green plum ( <i>Buchanania obovata</i> )	Northern Territory and Western Australia	Social
J. Gorman, Pearson, and Wurm [75], 2020	Demonstrate how Indigenous harvest practices can be scaled up to service new markets and still maintain cultural and natural values.	Case analysis and literature review	Kakadu plum	Northern Territory	Social, environmental, and economic
Lim et al. [45], 2020	Determine the antioxidant activities in Davidson's plum, finger lime, and native pepperberry.	Experiment (laboratory method used)	Davidson's plum, finger lime, and native pepperberry.	---	Social
Njume et al. [36], 2020	Investigate the bioactive and nutritional quality of selected native Australian food plants.	Experiment (laboratory method used)	Underground stems and rhizomes of <i>T. orientalis</i> ; berries of <i>L. parvi florus</i> ; tubers of <i>A. strictum</i> ; fruits of <i>C. rossii</i> , <i>D. revoluta</i> , and <i>R. candolleana</i> ; leaves of <i>C. alba</i> ; and seeds of <i>A. longifolia</i>	Victoria	Social and environmental
Phan et al. [48], 2020	Investigate the nutritional profile and antimicrobial activity of <i>Pittosporum angustifolium</i> .	Experiment (laboratory method used)	<i>Pittosporum angustifolium</i> (gumby gumby)	Queensland and South Australia	Social
Drake, Keitel, and Pattison [70], 2021	Identify how Australian edible native grasses have been used as food, and their potential in the globalised grains market.	Review	Native grains (e.g., <i>Acacia</i> species, seeds of native grasses)	-	Social, environmental, and economic
Lullfitz, Pettersen, Knapp, and Hopper [81], 2021	Test whether Noongar harvest of <i>Platysace</i> tubers improves nutrient and physical plant growth characteristics of the soil and aids further tuber production, as Elders suggest.	Field observation and experiment (laboratory method used)	<i>Platysace</i> tubers ( <i>P. deflexa</i> and <i>P. trachymenioides</i> ).	-	Environmental
McKemey et al. [76], 2021	Explore applications of a coproduced fire and season calendar, using Indigenous and Western knowledge, for contemporary cultural fire management.	Case study and literature review	Species traditionally used provided by calendars (e.g., native raspberry, vanilla lilly, etc.)/food cultivation	NSW (Wattleridge Indigenous Protected Area—IPA)	Social, environmental, and economic
Njume et al. [55], 2021	Develop food products with edible portions of selected native Australian plant species, and evaluate their acceptability and glycaemic index estimation.	Experiment (laboratory method used) and sensory evaluation.	<i>T. orientalis</i> , <i>A. longifolia</i> subsp. <i>Sophorae</i> , and <i>R. candolleana</i> subsp. <i>candolleana</i>	Victoria (Warrambool)	Social
Srivarathan et al. [46], 2021	Analyse the nutritional composition, phytochemicals, and antioxidant capacity of six Australian Indigenous edible halophytes.	Experiment (laboratory method used)	<i>Tecticornia</i> sp. (halophytes)	-	Social
R. Akter et al. [51], 2022	Investigate the protective effect of the Kakadu plum extracts against ethanol-induced cytotoxicity in HepG2 cells.	In vitro study	Kakadu plum	Northern Territory and Western Australia	Social

Table A2. Cont.

Reference/Year	Objectives	Method	Native Plant-Based Food Discussed/ Food Practices	Origin	Impacts Discussed
Dissanayake et al. [35], 2022	Summarise and assess the literature on the nutritional profile, chemical composition, and in vitro and in vivo therapeutic activities of Australian native vegetables and fruits.	Review	Australian native fruits and vegetables (e.g., Illawarra plum, Kakadu plum, muntries, bush tomato)	-	Social
Hay, Prakash, Daygon, and Fitzgerald [85] 2022	Understand the suitability of bushfood species for making natural additives for food.	Review	Edible Australian flora (e.g., <i>Ficus coronate</i> , <i>Dianella revoluta</i> , <i>Cyperus bulbosus</i> , etc.) Finger lime (five different cultivars: <i>Durhams Emerald</i> , <i>Chartreuse</i> , <i>Rhyme Red</i> , <i>Red Champagne</i> , and a hybrid cultivar (P1f2-10))	-	Economic
Johnson et al. [52], 2022	Characterise the phytochemical composition of five commercial Australian finger lime cultivars.	Experiment (laboratory method used)	Preparation of some native plant based foods (e.g., yam daisy)	Western Cape York Peninsula and Southern Murray–Darling Basin	Social
Morrison et al. [69], 2022	Investigate the food ways associated with earth ovens using sources from the southern Murray–Darling Basin and central Western Cape York Peninsula, Australia.	Ethnohistoric and ethnographic sources	Davidson’s plum, Queen Garnet plum, durian, litchi, breadfruit, jackfruit, mangosteen, papaya, jaboticaba, coffee, and seaweed <i>Terminalia hadleyana</i> (subsp. <i>carpentariae</i> C. T. White)—wild peach	-	Social
Panchal and Brown [63], 2022	Examine the potential of tropical and subtropical fruits from Australia as functional foods for metabolic syndrome.	Review	Wild <i>Oryza</i> species (Australian native rice)	Northern Australia	Social, environmental, and economic
Zhang et al. [47], 2022	Evaluate the chemical composition, morphology, and antimicrobial and functional properties of <i>T. carpentariae</i> fruits.	Experiment (laboratory method used)			
Abdelghany, Wurm, Hoang, and Bellairs, [42], 2022	Identify the major factors supporting the commercial production of wild <i>Oryza</i> species.	Review			

Table A3. Health benefits of Australian native plant-based foods and Aboriginal food practices.

Description	Findings	Native Plant-Based Food Related to/Aboriginal Food Practices
Antidiabetic properties	Some Australian native foods are high in fibre; have a low glycaemic index, low insulin responses, and inhibitory effects on enzymes linked to carbohydrates digestion, such as pancreatic $\alpha$ -amylase and $\alpha$ -glucosidase; have more resistant starch (more amylose than amylopectin); and have some phenolic compounds that are related to antidiabetic properties, such as gallic acid and $p$ -coumaric acid.	Cheeky yam ( <i>D.bulbifera</i> ), blackbean seed ( <i>C australe</i> ), wattle seed ( <i>Acacia aneura</i> ) [33,54], <i>Acacia coriacea</i> [53] native tubers, seeds, and roots [32], <i>T. orientalis</i> (reed or cattail), <i>A. longifolia</i> subsp. <i>sophorae</i> (seeds) and <i>R. candolleana</i> subsp. <i>Candolleana</i> (berries) [55], lilly pilly ( <i>Syzygium paniculatum</i> ), quinine bush, anise myrtle [35].
Anticancer activities	Some Australian native foods have shown the presence of phenolic compounds, such as gallic acid, catechin, quercetin, ellagic acid, and vitamin C, which were strongly linked to a reduction in cell viability and antiproliferative and proapoptotic activity against different types of cancer (colorectal, gastric, pancreatic, hepatocellular, cervical cancer, and leukemia). However, saponins from <i>Acacia ligulate</i> showed only weak activity against melanoma cancer [58]. An active component found in a perennial herb ( <i>Alpinia caerulea</i> ) may prevent angiogenesis progress, which is closely linked to cancer.	Lilly pilly ( <i>Syzygium paniculatum</i> ) [35,56], Kakadu plum [35,57], quandong ( <i>Santalum acuminatum</i> ) [57], Davidson’s plum [35,57], Illawarra plum ( <i>Podocarpus elatus</i> ) [35,50,57], <i>Acacia</i> seeds (wattle) [39], muntries, native currant ( <i>Antidesma erostre</i> ), native tamarind ( <i>Diploglottis australis</i> ), lemon aspen ( <i>Acronychia acidula</i> ), desert lime ( <i>Citrus glauca</i> ), bush tomato ( <i>Solanum centrale</i> ), green plum ( <i>Buchanania obovata</i> ), riberry ( <i>Syzygium luehmanni</i> ), blue quandong ( <i>Elaeocarpus angustifolius</i> ), bush cherry ( <i>Syzygium australe</i> ) [35], <i>Alpinia caerulea</i> [105].
Antimicrobial and antifungal activities	Due to the presence of some phenolic acids, tannins, flavonoids, and ascorbic acid, some Australian native foods showed potential antimicrobial properties against some Gram-positive and Gram-negative bacteria and fungi, such as <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>Salmonella Typhimurium</i> , <i>Bacillus cereus</i> , and <i>Candida albicans</i> .	Green plum ( <i>Buchanania obovata</i> ) [35,44,59], Kakadu plum ( <i>Terminalia ferdinandiana</i> ) [35,49], gumby gumby ( <i>Pittosporum angustifolium</i> ) [48], <i>Acacia cyclops</i> [37], <i>Acacia</i> seeds [39], riberry ( <i>Syzygium luehmanni</i> ), Davidson’s plum ( <i>Davidsonia pruriens</i> ), Bush cherry ( <i>Syzygium australe</i> ), Tasmania pepperberry [35], wild peach ( <i>T.carpentariae</i> ) [35,47].

Table A3. Cont.

Description	Findings	Native Plant-Based Food Related to/Aboriginal Food Practices
Antioxidant and anti-inflammatory properties	Australian native foods have some bioactive compounds such as phenolic acids (gallic, m-, and tannin acids), flavonoids (quercetin, catechin, and rutin), anthocyanins, tocopherols, and ascorbic acid, which are linked to antioxidant activities and potent activities, reducing inflammatory enzymes.	<i>Carpobrotus rossii</i> (pigface) [60], native pepperberry [45], <i>A. acidula</i> (lemon aspen) [61], <i>Mentha australis</i> (Australian native mint) [62], green plums ( <i>Buchanania obovata</i> ) [44,59], <i>Acacia</i> seeds ( <i>A. cyclops</i> , <i>A. microbotrya</i> and <i>A. victoriae</i> ) [37,39,50], underground stems and rhizomes of <i>T. orientalis</i> , berries of <i>L. parvi florus</i> , tubers of <i>A. strictum</i> , fruits of <i>C. rossii</i> , <i>D. revoluta</i> , and <i>R. candolleana</i> , leaves of <i>C. alba</i> , and seeds of <i>A. longifolia</i> [36], <i>Pittosporum angustifolium</i> (gumby gumby) [48], <i>Tecticornia</i> sp. (halophytes) [46], Queen Garnet plum ( <i>Prunus salicina</i> ) [35], Davidson's plum ( <i>Davidsonia pruriens</i> ) [45,63], Kakadu plum [35,51], Illawarra plum [35], finger lime—Durhams Emerald, Chartreuse, Rhyne Red, Red Champagne, and a hybrid cultivar (P1f2-10) [45,52], <i>Terminalia hadleyana</i> (subsp. <i>carpentariae</i> C. T. White)—wild peach [47], <i>Terminalia cunninghamii</i> (Pindan walnut) [29], crimson bottlebrush flowers ( <i>Callistemon citrinus</i> , <i>Myrtaceae</i> ) [106].
Promotion of a healthy gut and microbiota	Australian native foods can promote a healthy microbiota composition due to the presence of some unabsorbable carbohydrates, and some tannins that are metabolised by the gut microbiota and produce other bioactive compounds, increasing healthy bacteria species and decreasing toxic ones, and reducing infiltration of inflammatory cells. However, The Queen Garnet plum ( <i>Prunus salicina</i> ) showed no observed direct interactions with gut microbiota, but presented inhibitory action on inflammatory processes in some bowel diseases [35].	Some Australian roots, tubers [33], Davidson's plum ( <i>Davidsonia pruriens</i> ), yellow mangosteen ( <i>Garcinia dulcis</i> ), and purple mangosteen ( <i>Garcinia mangostana</i> ) [35].
Preventing obesity	Some Australian native fruits have shown the potential to prevent obesity. Some in vivo studies showed that some phenolic acids extracted from these foods reduce symptoms of metabolic syndrome, such as reducing abdominal and whole fat mass, reducing adipose cell size, reducing the level of triglycerides, reducing the pancreatic lipase, improving liver functions, and regulating the gut microbiota, increasing the antiobesity commensal <i>Akkermansia</i> bacterial population.	Illawara plum [50], Davidson's plum, yellow mangosteen ( <i>Garcinia dulcis</i> ), purple mangosteen ( <i>Garcinia mangostana</i> ) [35].
Reducing cardiovascular risk	Studies have showed that some extracts—tannin, flavonoids, and 3-hydroxy-3-methylglutaric acid— from <i>Carpobrotus rossii</i> (pigface) decreased collagen-induced plaquet aggregation and decreased atherogenic lipoproteins—total and non-HDL cholesterol.	<i>Carpobrotus rossii</i> (pigface) [60,65]
Preventing liver damage caused by alcohol	Kakadu plum extracts improved the activities of two enzymes linked to alcohol metabolism (ADH and ALDH) and showed potent antioxidant activities, demonstrating that it can be a promising therapeutic agent against liver damage caused by alcohol.	Kakadu plum [51]
More tolerance to allergy	Aboriginal diets, due to their vitamin levels and higher diversity in gut microbiome populations, can produce more tolerance to food allergens through protecting the intestinal epithelium and improving our innate and adaptative immune systems.	Aboriginal diet, not one specific food [64]
Emotional wellbeing, happiness, and relaxation	Aboriginal communities from central Australia reported that some reasons they collect, sell, and eat bush foods are enhancing wellbeing, happiness, and relaxation.	Bush tomato [66]
Intense physical activity	Aboriginal people used to have an active lifestyle. Food procurement and preparation, such as walking long distances, gathering fruits and vegetables, digging for tubers, grinding seeds, and gathering wood for fires were energy-intense processes.	Food procurement and preparation [32,33]
Food security	Aboriginal food practices related to processing some foods to remove bitter and toxic compounds, gathering, and eating together, sharing food, and the low-monetary forms of sustenance from native plant-based foods may contribute to food security.	Food preparation and consumption [32,67–71]

**Table A4.** Cultural benefits of Aboriginal food practices and Australian native plant-based foods.

Description	Findings
Spiritual connection with native foods.	Country and its foods are a living entity [68], e.g., the high spiritual connection with <i>Adansonia gregorii</i> [72] and <i>Cycas arnhemica</i> [73].
Native foods and Aboriginal food practices linked to identity.	Eating and harvesting together is a way to express identity [66,69].
Native foods use in traditional ceremonies and rituals.	Edible nuts ( <i>Araucaria bidwillii</i> —bunya pine) for feasts and ceremonies [74], and some native grains in traditional songs [70].
Native food as sources of food, medicine, and as cultural multipurpose tools.	Around 4000 plant species used to be sources of food and medicine [74] and some species were used as cultural multipurpose tools [78].
Aboriginal wild harvest of bush foods as a culture-based economy.	Incorporating Aboriginal knowledge and their epistemology in harvesting of bush foods, such as Kakadu plum [75] and Australian native rice [42], can be recognised as a culture-based economy.
Native foods as a vehicle to repatriation of knowledge.	Seasonal calendar, harvesting native foods together, and the use of traditional fire techniques for transmitting and revitalising their knowledge [66,76,77].

**Table A5.** Environmental benefits of Aboriginal food practices and Australian native plant-based foods.

Description	Findings
Aboriginal principles and values have environmental benefits.	Aboriginal culture has a spiritual connection with respect for natural resources [68,82].
Aboriginal food practices promote plant, water, soil, and animal health.	Ecological knowledge guides the right time to plant, harvest, and move to other locations before depleting the soil [68,82]; burning contributes to germinating certain seeds, helps with grass health [32,74] and biodiversity [76], and prevents potential destructive fires [73,80]; manipulations of the environment, such as the use of waterholes [32] and land and plant species management, were essential to human, plant and animal survival [68,73–75,81].
Aboriginal food consumption can be linked to a reduction in food waste.	Food consumption was seasonal-based, and it was consumed at the time it was available [32].
Some Australian native plant-based foods are environmental-stress-tolerant.	Some native foods are heat-tolerant [42,79], salinity-tolerant [42,78,83], drought-tolerant [42,78], have adapted underground structures to survive in hard conditions [84], are resistant to diseases [42], and are higher in mineral and total phenolic content concentrations, which may due to the hard environmental conditions [36].
Some species can provide ecosystem services.	They can provide carbon sequestration, water supply, flow regulation, pollination support, and erosion control [70].
Harvesting native plants is an opportunity to transmit ecological knowledge.	Harvesting, collecting, and eating bush foods is a way to transmit traditional ecological knowledge [66].

**Table A6.** Economic benefits of Aboriginal food practices and Australian native plant-based foods.

Description	Findings
Aboriginal food practices provide food supply.	Manipulation of the environment, some native species and land, the use of firestick farming, and some processing foods were methods for guaranteed food supply [32,68,70,80,82].
Australian native foods have a potential market.	Good farm gate value [79], potential use in food industry [42,68,72,75,78,85], and value-adding by Aboriginal communities [73].
Job opportunities for Aboriginal people.	Different Aboriginal groups across Australia apply their knowledge to add value to raw products, attending the market's requirements and providing job opportunities for these communities [66,73,75].

**Table A7.** Challenges to including Australian native plant-based foods in the current food system.

Description	Findings
Environmental challenges	Some species have difficult-to-control pests [42]; environmental conditions can affect the presence of secondary metabolites [51]; high salt content due to high salinity in the environment [46]; land affected by climate change [68].
Lack of knowledge	About agronomic protocols, stability under different conditions [35,42], nutritional composition [29], lack of in vivo and clinical studies [35,44,63].
Toxicity	Some species have antinutritive and toxic residues [33,37,39,85].
Lack of support	Lack of financial support and permissions from the government [68].
Processing challenges	Processing some species is time-consuming [41,42,70,81] and some natural additives have lower stability during thermal processing [85].
Cultural challenges	Improving protocols to ensure Aboriginal governance [73,75,85] and cultivating native species where they are linked to the Country [79].

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