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A Review: Benefit of *Pereskia bleo* (Kunth) DC Leaves

Natasya Hermawan[1*]
Institute of Food Science and Technology, College of Bioresource and Agriculture, National Taiwan University, Taipei, 10617, Taiwan

Sephira Odelia[2]
Food Technology Department, Faculty of Engineering, Bina Nusantara University, Tangerang, 15143, Indonesia

Lisa Angereni[3]
Global MBA, College of Management, National Taiwan University, Taipei, 10617, Taiwan

Leonid Fornaris Castro[4]
Department of Applied Sciences, Faculty of Technical Sciences, University of the Isle of Youth, Isle of Youth, Cuba

*** Corresponding author:**
Natasya Hermawan, National Taiwan University, Taiwan ✉ntsyhermawan2611@gmail.com

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Abstract

Background of study: *Pereskia bleo (Kunth) DC, commonly known as Daun tujuh jarum, is a leafy cactus traditionally used in South America, Southeast Asia, and other tropical regions for treating various ailments, including cancer, diabetes, hypertension, ulcers, inflammation, and rheumatism. Its leaves are commonly consumed raw, boiled, or prepared as tea and juice. In recent years, scientific interest in P. bleo has increased due to its rich antioxidant content, diverse phytochemicals, and promising therapeutic potential. Studies have identified proteins, essential amino acids, flavonoids, alkaloids, sterols, and phenolic compounds that may contribute to its health benefits.*
Aims and scope of paper: This review aims to summarize the traditional uses, nutritional value, phytochemical composition, and pharmacological activities of Pereskia bleo leaves, with particular emphasis on their antioxidant and medicinal properties. Applications in food, health, and traditional medicine are discussed, along with potential safety concerns.
Methods: A literature-based approach was employed, drawing on ethnopharmacological surveys, phytochemical investigations, and pharmacological studies to evaluate the properties and biological effects of the plant.
Result: *The findings indicate that P. bleo leaves possess antioxidant, anticancer, antimicrobial, and anti-inflammatory activities. Several studies report strong cytotoxic effects against cancer cell lines, high nutritional value, and low toxicity in animal models, with only mild adverse effects documented in humans.*
Conclusion: *Pereskia bleo demonstrates considerable potential as a natural antioxidant, antimicrobial, and anticancer agent. Although generally considered safe, its use should be approached with caution due to possible herb–drug interactions, and further clinical studies are required to confirm its efficacy and safety.*

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INTRODUCTION

Pereskia bleo DC (Kunth, Fig 1.) is widely recognized as a medicinal plant and is extensively used in the pharmaceutical field for various purposes. The *Cataceae* family includes 100 genera and 2000 species, among which *Pereskia bleo* is notable (Zareisedehizadeh *et al.*, 2014). This species is generally known as “Pokok Jarum Tujuh Bilah” or “Daun Tujuh Jarum” in Malaysia, “Daun Tujuh Jarum” in Indonesia, “Rosa Mole” or “Rosa Dose” in Brazil, “Qi Xing Zhen” or “Cak Sing Cam” in China, which literally means “Seven Star Needle” and also as “Rose Cactus” or “Chinese Rose”. *P. bleo* leaves are eaten as leafy vegetables and are also used by traditional practitioners to treat various ailments (Amaral *et al.*, 2022; Sharif *et al.*, 2013). The genus *Pereskia* originates from Panama and Colombia (Félix-Silva *et al.*, 2017). Native to South America, these plants have been cultivated in Singapore, Malaysia, Indonesia, India, and other tropical countries (Johari and Khong, 2019).

Figure 1. Photograph of *Pereskia bleo* flower and leaves (Zareisedehizadeh *et al.*, 2014).

The use of *P. bleo* extends from Panama to tropical regions worldwide. It is more frequently found in Singapore and Malaysia than in Indonesia, suggesting that Indonesians may not consume it as commonly as Singaporeans and Malaysians (Sharif *et al.*, 2015b). *P. bleo* is renowned for its medicinal properties and many health benefits, including treating diabetes, hypertension, and cancer-related diseases. While the leaves are most often used, other parts such as the stems, roots, fruits, and flowers are also utilized.

The plant has gained attention for its purported cancer-preventive and therapeutic properties, which has contributed to its widespread use among specific ethnic communities in Malaysia. These groups believe in the plant's medicinal efficacy and incorporate it into their traditional healthcare practices. Among them, consuming *P. bleo* leaves is common practice. The leaves may be eaten raw or prepared as soup by boiling them in water. This method allows the extraction of bioactive compounds believed to confer medicinal benefits. However, as with any traditional remedy, the use of *P. bleo* leaves should be approached with caution and under healthcare supervision, especially for individuals seeking alternative or complementary cancer treatments. Additional research is required to gain a deeper understanding of *P. bleo*'s medicinal properties and its potential role in cancer prevention and treatment (Er *et al.*, 2007).

In China, Malaysia, and Singapore, the leaves are commonly consumed either raw as vegetables or prepared as a broth from fresh leaves, serving dietary, detoxifying, and body-revitalizing purposes (Zareisedehizadeh *et al.*, 2014). The leaves may also be eaten raw, the flowers boiled, and the fruits juiced or cooked. *P. bleo* has long been used as a functional beverage, commonly processed into tea or juice. Drinking tea made from mature leaves—about six to seven pieces daily—has been claimed to prevent and treat several diseases (Siew *et al.*, 2019).

Research conducted over the past decade has increasingly focused on elucidating the antioxidant capacity of widely consumed foods and medicinal herbs. High consumption of foods and herbs rich in antioxidants has been linked to a lower risk of developing conditions such as cardiovascular disease. Multiple studies have emphasized the role of antioxidant-rich foods and herbs in the prevention of degenerative diseases (Carlsen *et al.*, 2010; Nikolic *et al.*, 2019).

P. bleo leaves are also valued for their nutritional content. Recognized for their substantial protein levels, they are traditionally eaten as leafy vegetables in Brazil. These leaves contain approximately 28% protein (dry weight), with about 60% comprising essential amino acids, including tryptophan, leucine, lysine, phenylalanine, and tyrosine. Analysis has revealed four major protein bands ranging from 15 to 61 kDa in the leaves. Moreover, the protein demonstrates high in vitro digestibility (76%). The amino acid profile and digestibility meet the Food and Agriculture Organization (FAO) requirements for children aged 2 to 5 years (Takeiti *et al.*, 2009). This suggests that *P. bleo* leaves could serve as a valuable dietary component, particularly for young children. The presence of essential amino acids and high digestibility further underscores their nutritional potential.

METHOD

This review employed a literature-based research approach to synthesize the published literature on *P. bleo* leaves. The literature review was designed comprehensively to focus on multiple dimensions of the plant, including its phytochemical composition, pharmacological activities, ethnobotanical uses, and safety profile. The studies included in the review comprised phytochemical analyses, *in vivo*

and *in vitro* experiments, ethnobotanical surveys, pharmacological evaluations, and animal-based safety studies.

For sampling, references were drawn from studies cited in the original literature without applying additional or exclusion criteria. The sources covered a range of geographic and experimental contexts, including traditional uses documented in countries such as Malaysia, Singapore, China, Panama, and Brazil. Phytochemical studies identified phenolics, flavonoids, alkaloids, sterols, and other compounds, while in vivo and in vitro studies investigated antioxidant capacity, cytotoxic activity, and toxicity. Pharmacological studies assessed antimicrobial, anticancer, anti-inflammatory, antihypertensive, and detoxifying effects, and safety evaluations utilized animal models to examine toxicity at varying dosages.

Data extraction and synthesis focused on qualitative analysis, summarizing reported outcomes and patterns across studies. No quantitative meta-analysis was conducted due to heterogeneity in study designs, populations, and methodologies. Limitations of the methodology include the reliance on published data, which may be affected by reporting bias, variability in experimental protocols, and incomplete documentation of results. Additionally, the absence of formal inclusion or exclusion criteria may have introduced selection bias, and the review did not assess the risk of bias within individual studies.

RESULTS AND DISCUSSION

P. bleo contains remarkable levels of calcium, chlorine, magnesium, phosphorus, potassium, and sulfur, as revealed through X-ray microanalysis (de Castro Campos Pindo and Scio, 2014). The phenolic content of *P. bleo* ranges from 2.5 to 4.1 mg/g (Johari and Khong, 2019). Another study reported 109 mg/g of phenolics, with catechin at 9.2 mg/g, epicatechin at 5.8 mg/g, quercetin at 1.1 mg/g, myricetin at 0.1 mg/g, β-carotene at 0.5 mg/g, and tocopherol at 0.7 mg/g dried leaves (Saptarini *et al.*, 2022; Sharif *et al.*, 2015a).

The leaves contain flavonoids and their derivatives, such as catechin, epicatechin, quercetin, myricetin, and vitexin. Their composition extends beyond proteins to include fatty acids, myo-inositol, and sugars such as galactose and phenanthrene (Rahman *et al.*, 2017; Siska *et al.*, 2023).

Four alkaloids have been identified in *P. bleo* leaves as follows: 3,4-dimethoxy-β-phenethylamine, mescaline, 3-methoxytyramine, and tyramine (Abdul-Wahab *et al.*, 2012). Other compounds include α-tocopherol, dihydroactinidiolide, sterols (β-sitosterol, campesterol, and stigmasterol), 2,4-di-tert-butylphenol, and phytol, which exhibit cytotoxic mechanisms against the A549 cell line (Lim and Mohamed, 2016). The presence of kaempferol, β-sitosterol glucoside, β-sitosterol, quercetin, and vitexin highlights the diversity of bioactive compounds. These compounds have been isolated from ethyl acetate and dichloromethane extracts, with β-sitosterol is predominantly present in hexane extracts (Sharif *et al.*, 2014). Kaempferol and quercetin were likewise identified in the leaf extracts.

Other compounds responsible for antioxidant activity in *P. bleo* include sterols (campesterol, β-sitosterol, stigmasterol, and α-tocopherol), amines (mescaline, 3,4-dimethoxy-β-phenethylamine, 3-methoxytyramine, and tyramine), flavonoid (vitexin), and polyphenols (phytol and 2,4-di-tert-butylphenol) (Guilhon *et al.*, 2015; Mat Darus and Mohamad, 2017). Each of these compounds contributes unique biological activities: (1) 3,4-dimethoxy-β-phenethylamine and 3-methoxytyramine function as neuromodulators, (2) mescaline acts as a hallucinogen, (3) tyramine functions as an adrenergic transmitter, (4) dihydroactinidiolide is used as a flavoring agent in tea and tobacco, (5) sterols demonstrate anti-atherosclerosis, antibacterial, anti-inflammatory, and antioxidant effects, (6) α-tocopherol acts as a dietary antioxidant, and (7) phytol serves as a precursor in vitamin E synthesis (Lekshmi *et al.*, 2023; Sharif *et al.*, 2015b).

Studies on the safety profile of *P. bleo* leaf extracts in animal models provide valuable insights into their potential toxicity and adverse effects. A single oral administration of leaf extract at doses ranging from 100 to 500 mg/kg did not result in behavioral alterations, lesions, or stomach bleeding in mice during a 15-day observation period (Abdul-Wahab *et al.*, 2012). Administration of the extract did not induce visual changes, mucosal lesions, ulcers, or toxic symptoms (Guilhon *et al.*, 2015). Acute administration of high doses (1,000–5,000 mg/kg) of lyophilized ethanol extract to female Wistar rats also did not produce any behavioral, cutaneous, or neurological changes. No tissue damage or changes in body or organ weights were observed (Er *et al.*, 2007). Notably, the ethyl acetate extract

of *P. bleo* leaves demonstrated greater antioxidant activity than the ethanol, hexane, and methanol extracts (Garcia *et al.*, 2019).

The traditional use of *P. bleo* by Indigenous Colombians highlights its significance as a medicinal plant in local healthcare practices. These traditional uses align with the broader understanding of medicinal plants as valuable sources of bioactive natural compounds, including antioxidants. Reports of *P. bleo* being used to neutralize snake bites and alleviate muscle-related issues underscore its therapeutic versatility and the importance of preserving traditional knowledge about plant-based remedies. Although these traditional uses offer important insights, additional scientific research is needed to confirm the claims, identify specific bioactive compounds, and understand their mechanisms of action. Combining traditional knowledge with modern science can enhance our understanding of *P. bleo*'s medicinal potential and support the development of evidence-based healthcare interventions (Zareisedehizadeh *et al.*, 2014).

In Panama, *P. bleo* is traditionally used to treat gastrointestinal disorders and as a nutritional source (Sharif et al., 2014). In addition, it demonstrates bioactivities such as anticancer, anti-inflammatory, antimicrobial, antioxidant, antirheumatic, antitumor, and anti-ulcer effects. The orange-red flowers and spiny shrub have been reported to be used in the treatment of cancer-related diseases, diabetes, gastric pain, hypertension, inflammation, rheumatism, and ulcers, as well as for general body revitalization (Abdul-Wahab *et al.*, 2012).

As a traditional medicine, *P. bleo* is believed to help treat cancer, diabetes, hypertension, inflammation, and skin injuries. It has long been used for conditions such as cancer, diabetes, gastric pain, headaches, hemorrhoids, hypertension, infections, ulcers, and inflammatory diseases including asthma and rheumatism (López-Barraza *et al.*, 2021; Zareisedehizadeh *et al.*, 2014). It is also consumed to boost immunity, detoxify nicotine, promote cartilage formation, prevent cancer and cancer relapse, prevent gastritis, stimulate blood flow, dissolve clots, replenish enzymes, and support bowel health. In medical applications, it has been used for breast cancer, benign growths (salivary gland, thyroid gland, and upper palate), cold sores, cold and flu symptoms, diabetes, leukemia, constipation, lung cancer, lymphoma, prostate cancer, renal problems, osteoarthritis, and uterine cancer (Siew *et al.*, 2019). Furthermore, it exhibits antiproliferative, antioxidant, antimicrobial, antiviral, antiparasitic, antinociceptive, and anti-inflammatory activities, as well as effects against weakness and nervousness (do Nascimento Magalhães *et al.*, 2019; Wan-Nadilah *et al.*, 2019).

Information from the Department of Pharmacy at the National University of Singapore offers insights into the patterns of use, methods of preparation, observed effects, and potential adverse effects of *P. bleo*. The findings indicate varied applications, including general health promotion, detoxification, cancer prevention, constipation, gastritis, improved blood flow, and immunity enhancement. Table 1 summarizes the reported uses, plant parts, and preparation methods.

Table 1. Participant-reported preparation methods of *Pereskia bleo* for promoting general health and preventing disease

Bioactivity	Headcount	Plant component	Preparation methods
General health promotion	9	Leaf Flower	• 2 to 10 fresh leaves eaten raw daily or weekly, alone or with other vegetables, without dressing • 1 to 2 flowers eaten raw if available, though seldom consumed because of scarcity
Cancer prevention	7	Leaf Flower	• 1 to 3 leaves eaten raw daily or at least weekly • 1 to 2 flowers eaten raw if available, though seldom consumed because of scarcity
Detoxification	7	Leaf	• 5 to 7 leaves boiled in water and drunk occasionally • 2 to 3 fresh leaves eaten raw daily
Constipation prevention	7	Leaf	• 1 to 10 fresh leaves eaten raw daily

Gastritis prevention	2	Leaf	• 15 to 20 leaves cooked with fried garlic and water and eaten daily or on alternate days • 1 to 3 leaves eaten raw daily or weekly
Blood circulation promotion (TCM concept)	2	Leaf Flower	• 7 leaves boiled in water and drunk occasionally • 1 leaf eaten raw daily, and 1 fresh flower eaten raw if available, though seldom consumed because of scarcity
Immunity improvement	`1	Leaf Flower	• 1 leaf or flower eaten raw daily

The recorded side effects were typically mild and reversible, including cold sensations, diarrhea, leg weakness, pruritus (itching), and prolonged prothrombin time, potentially resulting from drug-herb interactions. For example, one participant developed itching after applying cut fruit to the skin for over two hours, while another experienced diarrhea after consuming more than three raw leaves on an empty stomach. One participant who consumed the leaves daily while taking warfarin exhibited elevated prothrombin time (PT) and international normalized ratio (INR), suggesting a potential interaction. Although no serious adverse effects or toxicity were reported(Table 2.), these findings highlight the importance of cautious use, particularly for individuals prone to dermatological or gastrointestinal issues or those taking anticoagulants (Zareisedehizadeh *et al.*, 2022).

Table 2. Participant-reported effects of using Kunth (Zareisedehizadeh *et al.*, 2022)

Observed effects	Headcount
Sense of well-being	11
Symptomatic relief	8
Sense of well-being and symptomatic relief	2
Cure	4
No effect experienced	0
Worsening of symptoms	0

The pharmacological activities of *P. bleo* have been reported in various studies. Its properties include analgesic or antinociceptive (Gupta *et al.*, 1993), anti-ulcer (Ng *et al.*, 2003; Sim *et al.*, 2010), anti-hemorrhoid (Ng *et al.*, 2003), anti-hyperglycemic (Malek *et al.*, 2009), anti-hypertensive, anti-inflammatory (Malek *et al.*, 2009; Zareisedehizadeh *et al.*, 2014), antimicrobial (Abbdewahab *et al.*, 2009; Philip *et al.*, 2009), cancer prevention (Er *et al.*, 2007; Zareisedehizadeh *et al.*, 2014), anticancer (Zareisedehizadeh *et al.*, 2014), and detoxification (Johari and Khong, 2019). Methanol extracts of *P. bleo* have exhibited anticancer effects on human breast cancer cell lines (Parveen *et al.*, 2016). Some reports indicate that *P. bleo* leaves alone, without additional medications, contributed to cancer recovery. However, other studies found aqueous and methanol leaf extracts ineffective against certain breast cancer cells (4T1) and normal fibroblasts (NIH/3T3), showing variable cytotoxic activity depending on the extract and cancer type (Chan *et al.*, 2018; de Castro Campos Pinto and Scio, 2014).

Several studies have tested *P. bleo* against various cancer cell lines, including HeLa (cervical cancer), MDA-MB-231 (breast cancer), HepG2 (liver cancer), SW480 (colon cancer), and NIH/3T3 (normal fibroblasts) (Mohd-Salleh *et al.*, 2020). While some methanol extracts exhibited anticancer effects on hormone-dependent breast cancer cell lines (Siew *et al.*, 2019), others demonstrated cytotoxic activity against KB cells (nasopharyngeal carcinoma), as well as moderate to strong antiproliferative effects on breast (T47D), cervix (C33A), colon (HCT116), liver (SNU-182, SNU-449, HepG2), ovarian (PA-1), and uterine cancer cells (MES-SA/Dx5). The methanol extract showed activity against T47D cells with an IC_{50} of 2 µg/mL (Tan *et al.*, 2005) and HCT116 cells with an IC_{50} of 41.6 µg/mL (Siew *et al.*, 2019). In addition, In vitro studies also exhibited cytotoxic effects on cancer cell lines including MCF7 (breast carcinoma), A549 (lung carcinoma), HCT116 (colon carcinoma), KB (nasopharyngeal carcinoma), and CasKi (cervical carcinoma). These effects were especially notable in HeLa and MDA-MB-231 cells, with maximum concentrations reaching 99 µg/mL. Importantly, no harmful effects were observed on normal cell lines (NIH/3T3), suggesting selective toxicity. Phenol was identified as

the main compound in aqueous extracts, potentially mediating these cytotoxic effects. These results indicate that *P. bleo* could potentially serve as a natural source of anticancer compounds, though more studies are required to explore mechanisms, safety, and clinical applications (Gupta *et al.*, 2021; Mohd-Salleh *et al.*, 2020).

CONCLUSION

P. bleo has been proven to provide several health benefits, acting as a rich source of natural antioxidants suitable for use in dietary supplements or pharmaceutical applications. However, its application in beverages should be carefully monitored, as excessive consumption may have detrimental effects. Research has demonstrated that *P. bleo* possesses antimicrobial, antioxidant, anticancer, cancer-preventive, and antifungal properties. Although the plant may cause some adverse effects, reported cases are rare. Therefore, additional research is required to gain a deeper understanding of its potential side effects and ensure its safe use.

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AUTHOR CONTRIBUTION STATEMENT

Natasya Hermawan: Investigation, Resources, Writing – review & editing. **Sephira Odelia:** Conceptualization and Writing. **Lisa Angereni:** Conceptualization. **Leonid Fornaris Castro:** Investigation.

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