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Review Article

Bromelia Karatas L, Plant Species with Antimicrobial, Antioxidant and Hypoglycemic Activity

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Abstract

Bromelia karatas L. (*B. karatas* L.) is a species native of the Yucatán Peninsula with biotechnological potential for science and technology. The fruits of *B. karatas* L. have antioxidant and antimicrobial activity. In addition, the leaves of this plant species have the ability to reduce blood glucose levels. This property has not only been demonstrated in some communities through ancestral knowledge, but has also been demonstrated in the laboratory using the scientific method. Therefore, it is a promising plant for the development of functional foods, nutraceuticals, and pharmaceutical products, justifying the need to promote its research, conservation and sustainable use.

Keywords: Palabras clave, *Bromelia karatas* L, diabetes, piñuela, fruits, biotechnology

Geografic Distribution

B. karatas L. is a terrestrial plant [1] native of the Yucatán Peninsula [2], and is distributed from Mexico to Brazil [3].

Common Name

The common name of *B. karatas* L. is piñuela or Ch' om in the Mayan language [2] and in other regions of Mexico it is known as cocuixtle [4,5].

Botanical Description and Phenology

The piñuela (*B. karatas* L.) is a wild plant that can reach up to 3meters in diameter. It is characterized by its very short stem; its growth in rosette, with homorhyzic roots and numerous, thin, lanceolate leaves with marginal spines and measure between 1.5 and 2.5meters in length. The inflorescence is sessile, with floral clusters arranged in triangular shape; the flowers measure between 6 and 9cm in length. The fruits are fusiform and emerge from the center of the plant; they have between 5 and 9cm long and 1.5 to 2cm in diameter.

The fruits are reddish or slightly purplish in color, juicy, and acidic; they are covered by a brown and fibrous casing with irritating fuzz and have yellowish-white pulp [6,7] and exhibit non-climacteric respiratory behaviour [4].

Flowering occurs in July, while fruiting extends from July to November [2]. However, in some regions of the dry tropics of Mexico, fruiting has been recorded between January and March [8].

Botanical Synonimy

B. karatas L. has been considered a synonym of *Bromelia plumieri* (E. Morren) [6].

Traditional Use

The fruits of *B. karatas* L. are used for food purposes [9]; if eat-

ing them fresh [2] can cause itching and inflammation of the lips [10]. In some places is traditional to consume the fruit boiled with chili and lemon. In the northern of the state of Campeche, the fruits of *B. karatas* L. are used to make jams and jellies [7]. However, in other rural communities, the leaves of this plant are used to treat diabetes [11].

As part of our research work, we have localized the *B. karatas* L. plants in the community of Xohuayan, Yucatan, México (Figure 1).

Figure 1: *B. karatas* L. A) Growth of specimen on stony soil. B) Specimen with fruits. C) Harvested Fruit. D) Seeds in cut fruit.

Studies in the Laboratory

Previous studies have shown that the fruit of *B. karatas* L. is composed of 38.63% peel, 40.18% pulp, and 9.65% seeds [2]. The ripe pulp contains 3.13±0.2% protein, 0.61±0.04% crude fiber, 2.65±0.01% lipids, and 4.22±0.05% ashes; while the green pulp contains 13.3±0.2% protein, 9.2±0.01% crude fiber, 1.2±0.06% lipids, and 12.0±0.01% ashes [3].

Secondary metabolites with antioxidant activity have been identified in ripe fruits [12], and it has recently been shown that the fruit extract of *B. karatas* L. has bactericidal activity against various pathogen microorganism, such as *Escherichia coli, Salmonella enteritidis, Shigella flexneri* and *Enterococcus faecalis*, which evidence that the fruits are beneficial for health [13]. Furthermore, pre purified proteases from fruits of this species showed antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* [4]. Likewise, Ávalos-Flores and colleagues (2022) demonstrated that the protein extract of *B. karatas* L. fruits has antibacterial activity against *Salmonella typhimurium and Listeria monocytogenes* [14].

Regarding bioactive compounds, the juice of ripe fruits of *B. karatas* L. has a total phenolic content of 394.54±2.99mg Gallic Acid Equivalents (GAE)/100g and a flavonoid content of 187.86±0.95mg naringenin equivalents (NE)/100g; while the juice of green fruits has a total phenolic content of 280.28±6.83mg GAE/100g and a flavonoid content of 187.29±1.01mg NE/100g [12].

Studies in diabetic rats showed that the aqueous extract of *B .karatas* L. leaves reduces blood glucose levels in these rodents. A dose of 350mg/kg was the most effective concentration [11].

Conclusion

B. karatas L. offers a variety of health benefits. This plant not only its used for the treatment of diseases caused by certain bacterial species, but also for the treatment of oxidative stress and diabetes, which evidence that this plant species is a natural resource that can provide bioactive compounds for research in the field of pharmacology.

Acknowledgements

None.

Conflicts of Interest

None.

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