



Renealmia alpinia (Rottb.) Maas: An Unappreciated Fruit Current and Potential Uses of the Fruit



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Submission: July 02, 2019; Published: July 31, 2019

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Abstract

Currently, fresh horticultural products contribute to human health due to their nutritional and functional values. Some of these vegetables are exotic and unappreciated fruits such as *Renealmia alpinia* (Rottb.) Maas. This review aims to create a context regarding characteristics, composition, and antioxidant properties, emphasizing the potential uses in the food and pharmaceutical industries. Some nutritional including proteins and fats from a vegetable source such as the *R. alpinia* (Rottb.) Maas fruit is a valuable alternative for its incorporation in different products. Also, pigments such as anthocyanins and carotenoids contained in the pulp and peel of the fruit are a natural dye proposal for food processing. Finally, based on the revised information can be recommended the production of *R. alpinia* (Rottb.) Maas, due to this fruit is a valuable source of natural food colorants and antioxidants compounds.

Keywords: Characterization and composition; *Renealmia alpinia*; Fruits; Bioactive compounds

Introduction

The genus *Renealmia* belongs to the family *Zingiberaceae*, subfamily *Alpinioideae*, and includes approximately 75 species distributed throughout tropical regions of the Americas and Africa [1]. There are four species of the genus *Renealmia*: *R. mexicana*, *R. alpinia*, *R. occidentalis* and *R. cernua* in Mexico [1,2]. Especially in the region of Cuetzalan, in the state of Puebla, a great diversity of fruits and plants are produced, including *Renealmia alpinia* (Rottb.) Maas, this fruit is known as "xkijit" in the Totonac dialect, and it means "wild plant of edible fruits" [3].

R. alpinia (Rottb.) Maas in the immature stage, the fruit peel is red but turns black when ripe while the pulp has a yellow color with a considerable amount of black seeds [3]. These characteristics of the fruit are related to their physicochemical properties, nutritive, and functional components. *R. alpinia* (Rottb.) Maas fruits are a new nutritional alternative, a natural source of pigments and bioactive compounds with antioxidant properties.

Likewise, Negrelle [4] and Gevú et al. [5] mention that some species of *Renealmia* are used due to their anticancer properties. Some of the compounds that constitute these plants have antioxidant properties which are associated with the prevention of chronic degenerative diseases.

Despite the background, there are very few studies related to the consumption and production of *Renealmia alpinia* (Rottb.) Maas, which is why this review aims to create a context regarding characteristics, composition, and antioxidant properties of this fruit emphasizing the potential uses in the food and pharmaceutical industries.

General Characteristics and Composition



Figure 1: *Renealmia alpinia* fruit.

R. alpinia is a monocotyledonous plant with fruits that are clusters of several specimens of elliptical-oval shape, 3-4cm long and 1.5-2cm in diameter with many seeds inside [6]. The color of the pericarp varies depending on its state of maturation, the fruits completely immature are green, and they change to red (intermediate stage of maturation) and dark

purple when the fruit is fully ripe and ready for consumption (Figure 1) [1,3]. Furthermore, these fruits grew from lowland evergreen jungles up to 1,500m, and it is an herbaceous plant of 2-6m high, within fluorescence of 12-50cm in length (Figure 1).

According to the country and the region in which the fruit is located, it receives different names, some examples are mentioned in Table 1

There are few reports about the physicochemical properties, nutritional composition, and antioxidant content of the *Reinealmia alpinia* (Rottb.) Maas. Some parameters, such as pH and titratable acidity in fruits, are of high relevance because they are related to the levels of acceptance by the consumer. The peel of *R. alpinia* (Rottb.) Maas showed very similar values of pH and titratable acidity in comparison with common fruits such as bananas and apples. Concerning the contents of proteins, fats, and carbohydrates (Table 2), Luna et al. [6] and Julián Loaeza [12] reported that the pulp of *R. alpinia* (Rottb.) Maas presented higher values than those registered with other similar fruits such as *Annona diversifolia* and *Psidium guajava*. Besides, another essential nutrient in pulp was vitamin C (28.3mg/100mg), which was five times higher than be in the peel (Table 2).

Table 1: Common names of *Reinealmia alpinia* fruit according to its location.

Common name	Country	Reference
Tapioka-kumpia (Awajún)	Ecuador	Quizhpe and Jackelinne [7]
Matandrea	Colombia	Arango and Flórez [8]
Achiria de monte	Colombia	Arango and Flórez [8]
Cardamomo	México	Lascurain [9]
Huilimul	México	Lascurain [9]
X'kijit	México	Luna et al. [6]
Mardi gras	Trinidad y Tobago	Lans et al. [10]
Corovahiiba	Perú	Delgado [11]

Table 2: Nutritional and components of pulp and peel of (*Reinealmia alpinia* (Rottb.) Mass) fruit.

Nutrients (%)	Pulp	Peel
Water	76.6	94.8
Protein	4.2	0.7
Fat	8.6	2.5
Carbohydrates	10.3	1.9
Minerals	0.4	0.1

Likewise, the color of the fruit is a parameter related to the content of bioactive compounds, yellow pulp, and the red-purple peel indicated the presence of bioactive compounds such as phenolic compounds, flavonoids, carotenoids and anthocyanins [6]. The above was corroborated in the study carried out by Jimenez-Gonzalez et al. [13], who identified two

compounds belonging to the group of anthocyanins present in the peel of *Reinealmia alpinia* (Rottb.) Maas. Finally, according to Luna et al. [6], the FRAP value on the peel was superior to the pulp; probably it is due to the peel's high anthocyanins content.

Current and potential uses

Different uses and applications have been reported due to the multiple compounds that the mentioned fruit presents. Macía [3], mentions that it is used as an ingredient in sauces, in the indigenous communities that inhabit some regions of the Sierra Norte of the state of Puebla, Mexico. On the other hand, Van Ander et al. [14], notes that this fruit was consumed by the Ameridians (American aborigines). Other applications include the use of oil when it is obtained from the seeds for frying processes [3]. Some industries use the fruit as a flavoring compound, for the elaboration of gin [15]. The leaves can be used to wrap fish as they impart a spicy flavor [3]. Finally, and due to its innocuous consumption, Jimenez-Gonzalez et al. [13] used the microencapsulated pigments of the pericarp of the *R. alpinia* (Rottb.) Maas and evaluated their possible use as a dye in the food industry. In the same way, some studies have been carried out, involving the use of *R. alpinia* (Rottb.) Maas, to counteract the effects of the poison after the bite of some snakes [16-19]. Likewise, Gómez-Betancur et al. [20] showed that the methanolic and aqueous extracts had significant effects acting as an analgesic since it decreased the sensation of pain due to the presence of some flavonoid compounds. Gómez et al. [21] tested the analgesic properties of the essential oils from the leaves, helping to reduce headache and fever [8], likewise, this plant is credited with beneficial effects in the treatment of skin and herpes infections [22]. Finally, the use of baths with the infusion of the fruit has an effect as a muscle relaxant [10].

Conclusion

Reinealmia alpinia (Rottb.) Maas or "x'kijit" fruit is a new nutritional alternative, a natural source of pigments and bioactive compounds with antioxidant properties and different therapeutic applications. These properties could help elucidate commercial uses and products of the fruit components in foods and the pharmaceutical industries.

Acknowledgment

The authors thank MC Mayra Juarez Almaraz by her participation in the translation of this paper.

Conflict of Interest

This paper is original research that has not been published previously and has not been under consideration for publication elsewhere. Likewise, on the part of the authors, there is no economic interest or conflict of interests.

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DOI: [10.19080/NFSIJ.2019.09.555755](https://doi.org/10.19080/NFSIJ.2019.09.555755)

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