HiLL PUBLISHING

International Journal of Food Science and Agriculture, 2025, 9(4), 483-487
https://www.hillpublisher.com/journals/jsfa/
ISSN Online: 2578-3475
ISSN Print: 2578-3467

Pitahaya and Huanzontle: Nutritious Treasures

Edmundo Arias

Department of Applied Technology, Mexican Institute of Appropriate Technologies, IMETA, Mexico 07270, Mexico.

How to cite this paper: Edmundo Arias. (2025). Pitahaya and Huanzontle: Nutritious Treasures. *International Journal of Food Science and Agriculture*, 9(4), 483-487.
DOI: 10.26855/ijfsa.2025.12.022

Received: November 25, 2025
Accepted: December 22, 2025
Published: February 2, 2026

Corresponding author: Edmundo Arias, Department of Applied Technology, Mexican Institute of Appropriate Technologies, IMETA, Mexico 07270, Mexico.

Abstract

Here is presented a comprehensive review of two underutilized but highly potential Mexican botanical resources: Pitahaya (Hylocereus spp.) and Huauzontle (Chenopodium berlandieri subsp. nuttalliae). Some aspects related to the two plants are described, Pitahaya and Huaunzontle, both belonging to the order Caryophyllales. Both are underutilized but have highly potential botanical resources. The importance of these crops is emphasized due to their potential for adaptation to soils with moisture deficits, their ability to acclimate to adverse environments, and their nutritional, productive, and economic values. The main uses of both plants are for food and medicinal purposes. The analysis transcends basic nutritional characterization to explore their economic viability, agronomic resilience, and emerging pharmaceutical and nutraceutical applications. The functional compounds from two plants are moving rapidly into the pharmaceutical supply chain. Both the Pitahaya and the Huauzontle contain potent natural compounds that are actively being researched for their anti-inflammatory and anti-fibrotic potential, offering hope as adjuvants for severe conditions like Pulmonary pathologies, including Idiopathic Pulmonary Fibrosis (IPF), which currently has limited treatment options.

Keywords

Acclimatization; marketing; crop; underutilization

1. Introduction

1.1 Pitahaya

It is a cactus belonging to the order Caryophyllales, where it shares the presence of betalains with other families [1]. It is a complete fruit due to its nutritional composition, highlighting the presence of antioxidants, especially betacyanins and betaxanthins, in addition to its protein contribution, mainly because of its fiber content and a set of polyunsaturated fatty acids.

It is important to mention that immature stems are also used for human consumption [2]. Its cultivation is a profitable economic activity in rural regions where climatic and soil conditions are not favorable for other crops, due to the scarcity of water and the rocky characteristics. The species H. undatus has great economic importance in Mexico, and its fruits are highly valued for their appearance and taste; they are also easily marketed in local, regional, and foreign markets. This plant can be fully utilized and is notable for the economic importance of its fruits [3].

1.2 Huaunzontle

Its name comes from the Nahuatl, huauhtzontli, which breaks down into huauhtli (“amaranth”) and tzontli (“hair”). Huauzontle is considered a pseudocereal because of its uses and properties that are so similar to those of true cereals.

Among the macronutrients in huauzontle, carbohydrates are the most abundant, making up almost 60%. This is why it is often associated with cereals. Notable components include starch and indigestible carbohydrates such as dietary fiber [4].

The protein values are among the highest in vegetables, surpassing quinoa and amaranth. The amino acids found

in the highest proportion are 2 essential ones: lysine and leucine, and 2 non-essential ones: aspartic and glutamic acids.

The few lipids that this vegetable contains are of the unsaturated type. They are distributed as 12% omega-3, 53% omega-6, and 24% omega-9. It is important to include it in the diet since this plant can be used as a vegetable.

2. Characteristics

2.1 Pitahaya

The pitaya (Cereus sp.) belongs to the Kingdom Plantae, Class Angiospermae, Subclass Dicotyledoneae, Order Opuntiales, Family Cactaceae, Scientific name: Cereus sp., with its variant Hylocereus sp. The optimal altitude for this type of plant is between (874-1,9668 yd) above sea level (874.89-2023.18 yd), with temperatures ranging between 18°C and 25°C (64.4°-77° F). It adapts to well-drained soils with a slightly acidic pH of 5.5-6.5; it thrives in warm, humid environments and responds positively to light intensity [5]. It is a climbing, perennial cactus of a shrubby type, which can reach up to 2 m (2.187 yd) in height. It grows in areoles, and its cladodes extend between 0.50 and 1.50 m (0.54-1.64 yd) in length and 0.03-0.06 m (0.032-0.65 yd) in width, with toothed margins. At their edges and tips, there are crowns of spines measuring 0.01 meters (0.010 yd).

Figure 1. From left to right: A. Side view of a pitahaya flower; B. Front view of a pitahaya flower; C. Stems with aureoles and succulent cladodes; D. Pitahaya fruit.

The most well-known benefit of this fruit is its antioxidant capacity, which is attributed to its seeds due to their high content of natural fatty acids, as well as linoleic acid 64.5%, oleic acid 13.9%, and palmitic acid 14.4% [6], being the most important linoleic acid, as it functions in the body as a buffer, capturing cholesterol and generating a cardiotonic effect. In 100 g (3.527 oz) of the edible part of fresh pitahaya, there is: water 83 g (2.927 oz), protein 0.159-0.29 g (0.005-0.010 oz), fat 0.21-0.61 g (0.007-0.021 oz), fiber 0.7-0.9 g (0.024-0.031 oz), ash 0.64-0.68 g (0.022-0.023 oz), as well as the presence of minerals such as Calcium 6.3-8.8 mg (0.222-0.310 oz), Phosphorus 30.2-36.1 mg (1.065-1.273 oz), Iron 0.55-0.65 mg (0.019-0.022 oz); pigments such as carotene 0.005-0.012 mg (0.000-0.00004 oz); vitamins such as Thiamine (Vitamin B1) 0.28-0.43 mg (0.009-0.015 oz), Riboflavin (Vitamin B2) 0.043-0.045 mg (0.001-0.001 oz), Niacin (Vitamin B3) 0.97-0.430 mg (0.034-0.015 oz), Vitamin C 8-9 mg (0.282-0.317 oz) [7].

2.2 Huaunzontle

Figure 2. Huaunzontle.

From a botanical point of view, it belongs to the Chenopodiaceae family. Chenopodium berlandieri was described by Alfred Moquin-Tandon and published in Chenopodearum Monographica Enumeratio 23. 1840.

This plant is annual, considered fast-growing, reaching 10 to 105 cm (3.937-41.338 in) in height; leaves of variable shape, usually triangular, 1.2-12 cm (0.393-4.724 in) long and 0.5-7 cm (0.196-2.755 in) wide.

Huauzontle has the shape of a small, elongated tree, with alternate, oval leaves, and green flowers in the form of little balls that form long clusters. These flowers are used as food; the stems and branches are thick and are also eaten.

Table 1. Scientific classification

Scientific classification	
Kingdom	**Plants**
Clade	**Tracheophytes**
Clade	**Angiosperms**
Clade	**Eudicots**
Order	**Caryophyllales**
Family	**Amaranthaceae**
Gender	*Chenopodium*
Species	*C. nuttalliae*
Binomial name	
Chenopodium nuttalliae Saff.	
Synonyms	
Chenopodium berlandieri subsp. *nuttalliae*	

Source: Ref [8]

Table 2. The macronutrients are expressed in grams of the vegetable. In the case of minerals, they are also presented in milligrams (mg)

Humidity:	3,8 g	(0.134 oz)
Ash:	17.3 g	(0.610 oz)
Protein:	23 g.	(0.811 oz)
Fiber:	16,9 g	(0.596 oz)
Carbohydrates:	56,8 g	(2.003 oz)
Lipids:	2,8 g	(0.098 oz)
Phosphorus:	241 mg	(8.501 oz)
Magnesium:	464 mg	(16.367 oz)
Potassium:	1862 mg	(65.680 oz) (53 % of the recommended daily value)
Calcium:	504 mg	(17.778 oz) (50 % of the recommended daily value)
Iron:	7,1 mg	(0.250 oz) (70 % of the recommended daily value)

Source: Ref [8]

3. Importance

3.1 Pitahaya

Pitahaya has great potential because it can be grown in regions with scarce water resources. The cultivation of pitahaya becomes an activity of importance, both economically and socially, for rural communities, as it is a plant resistant to various limiting climatic conditions, and its management requirements are minimal.

Pitahaya has great industrial potential due to its high content of betalains, pigments that have antioxidant properties and are considered an alternative to the use of artificial colorants in food.[9] In addition, its high content of soluble solids (up to 18 °Brix) gives it great commercial and agro-industrial potential. The pulp can be processed (freezing, concentration, dehydration, fermentation, thermal processing, and chemical preservation) as well as extracting the dyes and pectins contained in the peel or pulp, for which technology is available at home, artisan or industrial scales; it is also used in the production of juices, sorbets, jellies, ice creams, yogurt, jam, syrup, candies, and pastries. Another advantage of this crop is that the fruit fetches a good price in local, regional, national, and international markets because it is an exotic fruit. Additionally, it can be developed in the short and medium term, both in family gardens and in commercial crops [10].

3.2 Huaunzontle

Huauzontle contains more phenolic compounds than flavonoids. According to some experts, its concentrations are very high and have antioxidant activity, being higher than those of lettuce, endive, and spinach. In fact, researchers determined that huauzontles are the main wild edible plant with the highest percentage of free radical inhibition. They have antioxidant properties.

The high fiber content of this type of quelite is beneficial for preventing constipation, as cellulose and hemicellulose regulate digestive mechanics.

Additionally, soluble fiber, such as pectins and mucilages, can lower blood cholesterol levels and regulate the absorption of sugar in the intestine.

It can be combined with other grains to compensate for deficiencies in lysine and leucine in the diet. 100 grams (3.527 oz) of this vegetable are capable of covering high percentages of the daily intake of calcium, iron, potassium, and magnesium required. However, part of these minerals are bound with phytic acid, a molecule characteristic of vegetables that store phosphorus and can be used in gluten intolerance.

4. Conclusions

4.1. Pitahaya

It can be grown in regions with scarce water resources and can withstand different limiting climatic conditions with minimal management requirements. It can be developed in the short and medium term, both in family orchards and commercial crops.

It is a very special fruit due to all its nutritional and even medicinal characteristics, with a range of applications that go from relieving stomach problems to addressing endocrine issues and improving the functioning of the digestive tract.

4.2 Huaunzontle

The benefits are related to its nutritional value and the presence of active metabolites. Micronutrients are also found in very high amounts. 100 grams (3.527 oz) of this vegetable covers 50% of the recommended daily calcium and 70% of the iron.

Its intake provides potassium at more than 50% of the established amount, and the magnesium content is so high that it ensures more than 100% of the daily requirement. As for vitamins, it provides A, E, and the B complex.

Unlike wheat flour and other cereals, huauzontle does not contain gluten, that is, prolamin-type proteins, and therefore, it can be recommended as a source of plant-based protein for patients with gluten intolerance or sensitivity.

In addition, its abundant protein contains essential amino acids that are absent in many cereals. For this reason, it is considered an ingredient that complements the diet.

The high intake of dietary fiber helps regulate intestinal function, blood sugar, cholesterol, and triglycerides. It is also recognized for its antioxidant functions in combating free radicals [11].

References

[1] Esquivel P, Araya Y. Characteristics of the pitahaya fruit (Hylocereus sp.) and its potential use in the food industry. Ven J Food Sci Technol. 2012;3(1):113-129.

[2] Ortiz HYD. Pitahaya: a new crop for Mexico. Limusa-Grupo Noriega Editores; 1999.

[3] Livera MM, Ortiz HYD, Castillo MR, et al. Pitahaya (Hylocereus spp.): problems, achievements, and perspectives. In: Cruz IS, Muratalla A, Kato AT, eds. Research in Service of the Mexican Countryside. Colegio de Postgraduados, Montecillo Campus; 2010:57-59.

[4] Cortés NR, García-Mateos M, González A, Sahagún-Castellanos J, Jiménez-Arellanes A. Nutritional and nutraceutical characteristics of vegetables with ancestral use in Mexico. Rev Fitotec Mex. 2018;41:245-253.

[5] Britton NL, Rose JN. The Cactaceae: Descriptions and Illustrations of Plants of the Cactus Family. Courier Corporation; 1963.

[6] Chemah T, Aminah A, Norihamy WA. Determination of pitaya seeds as a natural antioxidant and source of essential fatty acids. Int Food Res J. 2010;17:1003-1010.

[7] Morton J. Strawberry pear. In: Morton JF. Fruits of Warm Climates. 1987:347-348.

[8] CONABIO. Taxonomic catalog of species of Mexico. 1. In Capital Nat. Mexico. CONABIO; 2009.

[9] Dialnet. Utilización Industrial de la pitahaya (Hylocerus undatus). 2023.

[10] ScienceDirect. Betalain-rich dragon fruit consumption improves vascular function. 2022. doi:10.1016/j.ajcn.2022.03.018.

[11] SciELO México. Propiedades antioxidantes y antiinflamatorias de huauzontle (Chenopodium berlandieri subsp. nuttalliae) fermentado. 2023. doi:10.35196/rfm.2023.3.245-253.