Passiflora ligularis

Scientific Name

***Passiflora ligularis* Juss.**

Synonyms

Passiflora lowei Heer ex Regel, *Passiflora serratistipula* Moc. & Sessé ex DC., *Passiflora tiliaefolia* Sessé & Moc. non L.

Family

Passifloraceae

Common/English Names

Granadilla, Sweet Granadilla, Grenadia, Sweet Passion Fruit, Water lemon.

Vernacular Names

Bolivia: Granadilla;
Brazil: Maracujá-Urucú (Portuguese);
Costa Rica: Granadilla;
Danish: Sød Granadil, Amaril;
Dutch: Zoete Markoesa;
Eastonian: Keeljas Kannatuslill;
Ecuador: Granadilla;
French: Barbadine, Granadille, Grenadelle, Grenadille Douce, Grenadille Des Montagnes;
German: Granadille, Süße Granadilla, Zungenförmige Passionsblume;
Guatemala: Granada China, Granadilla Común, Cranix;
Hawaiian: Lani Wai, Lemi Wai, Lemona;
Indonesia: Buah Belebar, Buah Selaseh, Buah Susu, Markusa Leutik;
Jamaica: Granaditta;
Mexico: Granadilla;
Papua New Guinea: Sugar Fruit;
Peru: Apicoya, Granadilla, Tintin;
Spanish: Cranix, Granadita, Parcha Dulce;
Venezuela: Granadita, Granadilla De China, Parchita Amarilla, Parcha Dulce, Parcha Importada.

Origin/Distribution

Sweet Granadilla is native to the Andes Mountains between Bolivia and Venezuela, with Peru as the main producer. It grows as far south as northern Argentina and as far north as Mexico. Outside of its native range it grows in Florida, New Zealand, China and in tropical highlands of East Africa, South Africa Sri Lanka, Jamaica, Indonesia, Hawaii, Papua New Guinea and Australia. The major producing countries are Peru, Venezuela, Colombia, Ecuador, Brazil, South Africa, and Kenya. The main importing countries are the United States, Canada and Europe (Belgium, Holland, Switzerland, and Spain).

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Agroecology

Sweet granadilla thrives best in the cool sub-tropics in areas with temperatures ranging from 15°C to 18°C and between 600 and 1,000 mm of annual precipitation. It occurs wild and is cultivated in its natural range at 900–2,700 m elevations. It can grow in the cool highlands in the tropics like in Indonesia, Papua New Guinea, Jamaica, Sri Lanka and elsewhere in the tropics. It is grown at high elevations in the tropics, between 2,100 and 2,700 m in Ecuador, and between 800 and 3,000 m in Bolivia and Colombia, and at lower elevations in the subtropics. It is naturally adapted to high cool humid mesic forests and wet rainforests. The plant is intolerant of heat and can withstand short periods of light frost. It grows on loamy to well drained, light clayey soils and on moist volcanic soils like in Indonesia and Hawaii. It prefers a soil pH range of 6.1–7.5.

Edible Plant Parts and Uses

The fresh, juicy, aromatic arils surrounding the seeds are eaten together, scooped from halved fruit with a spoon. The fruits are also eaten served over ice-cream or processed into juice, nectars and used in cakes.

Botany

A robust, vigorous liana (vine) with terete or weakly angled, striate stems and a woody base, climbing by tendrils up trees. Leaves cordate, 8–20 cm long by 6–15 cm wide, apex pointed, margin entire, conspicuously veined, medium green adaxially and pale green abaxially, glabrous, borne on petioles with 4–8 elongate, usually paired filiform nectaries (glands) and with oblong-ovate, 20–40 mm long stipules (Plate 1). Flowers pendent, showy, large, campanulate, 8–12 cm in diameter, peduncles solitary or paired, bracts ovate, 3–5 cm long, 1–3 cm wide; hypanthium 0.5–0.9 cm long; sepals and petals greenish white or white tinged with violet; corona in 5–7 rows, the filaments with white and purple bands, 3 cm long (Plate 1). The fruit is broad-ellipsoid, ovoid to sub-globose, 6–8 cm long, green with purple blush on the sunny side and minutely white-dotted when unripe (Plate 2), orange-yellow with white specks when ripe (Plates 3 and 4). The rind is smooth, thin, firm and brittle externally, white and soft on the inside, enclosing numerous black, flat, pitted seeds. Each seed is enveloped by greyish to yellowish-white, mucilaginous, very juicy, aromatic aril (pulp).

Nutritive/Medicinal Properties

Proximate nutrient composition of the pulp and seeds together per 100 g edible portion based on analyses made in Ecuador, El Salvador, Costa Rica and Guatemala (Morton 1987) was reported as: moisture 69.9–79.1 g, protein 0.340–0.474 g, fat 1.50–3.18 g, crude fibre 3.2–5.6 g, ash 0.87–1.36 g, calcium 5.6–13.7 mg, phosphorus 44.0–78.0 mg, iron 0.58–1.56 mg, carotene 0.00–0.035 mg, thiamine 0.00–0.002 mg, riboflavin 0.063–0.125 mg, niacin 1.42–1.813 mg, ascorbic acid 10.8–28.1 mg.

A new polysaccharide with a high molecular weight (greater than 1×106 Da) consisting of six different sugar residues: xylose, glucose, galactose, galactosamine, an unknown component, and fucose in the relative ratio of 1:0.5:0.2:0.06:0.05:traces was extracted and characterized from the peels of *Passiflora ligularis* (granadilla) fruits (Tommonaro et al. 2007). The formation of a biodegradable film using this novel xyloglucan was reported, and the anticytotoxic activity of the polysaccharide was also observed using the brine shrimp bioassay. Considerable antioxidant activity (Trolox equivalent antioxidant capacity (TEAC) value of 0.32 μM/mg fresh product) of this xyloglucan was noted in the lipophilic extracts of *Passiflora ligularis* fruit, indicating, that the fruit could provide an alternative source of bioactive compounds.

Plate 1 Flowers and leaves of sweet granadilla

Plate 2 Young, immature sweet granadilla fruits

Plate 3 Ripe sweet granadilla fruits

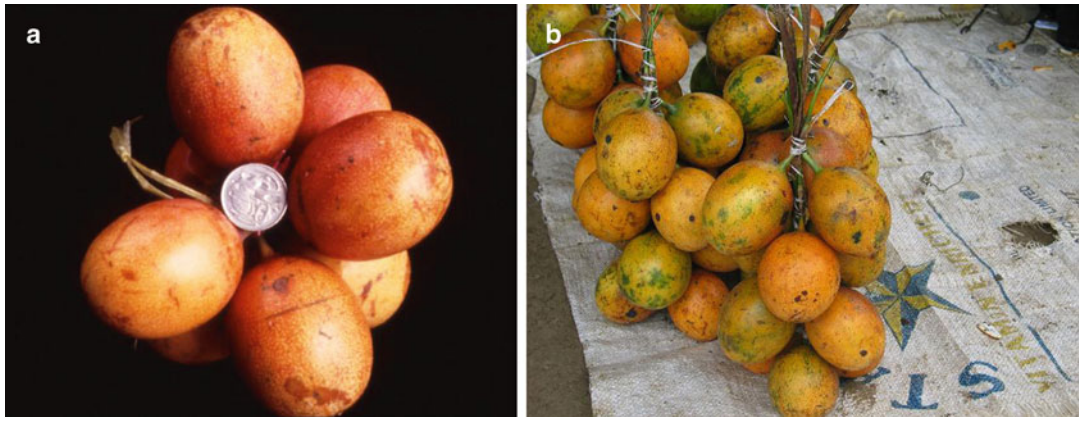

Plate 4 (**a**, **b**) Ripe sweet granadilla fruits on sale in local markets

Other Uses

None, sweet granadilla is grown for its fruit and fragrant, ornamental flowers.

Comments

The plant is propagated from seeds or cuttings.

Selected References

Fouqué A (1972) Espèces fruitières d'Amérique tropicale. IV. Les Passiflorées. Fruits 27:368–382

Green PS (1972) *Passiflora* in Australasia and the Pacific. Kew Bull 26:539–558

Jansen PCM, Jukema J, Oyen LPA, van Lingen RG (1992) Minor edible fruits and nuts. In: Verheij EWM, Coronel RE (eds) Plant resources of South-East Asia no. 2: edible fruits and nuts. Prosea Foundation, Bogor, pp 313–370

Morton JF (1987) Sweet Granadilla. In: Fruits of warm climates. Julia F. Morton, Miami, pp 330–331

National Research Council (1989) Lost crops of the Incas: little-known plants of the Andes with promise for worldwide cultivation. BOSTID/National Research Council/National Academy Press, Washington, D.C., 428 pp

Tommonaro G, Rodríguez CS, Santillana M, Immirzi B, Prisco RD, Nicolaus B, Poli A (2007) Chemical composition and biotechnological properties of a polysaccharide from the peels and antioxidative content from the pulp of *Passiflora ligularis* fruits. J Agric Food Chem 55(18):7427–7433

Wagner WL, Herbst DR, Sohmer SH (1999) Manual of the flowering plants of Hawaii, Revised edn. Bernice P. Bishop Museum special publication/University of Hawai'i Press/Bishop Museum Press, Honolulu, 1919 pp (two volumes)