



Momordica cochinchinensis

Cucurbitaceae



Gac is a woody, perennial plant with vining stems reaching 6 m or more in length. Growing from tuberous roots, the vines are often seen climbing on fences or into the tops of trees. Its large (10-15 cm wide), dark green leaves have three to five lobes. Gac is dioecious, meaning that some plants will have female flowers and others will have male flowers. Fruits are ovate (egg-shaped), 10-15 cm long X 10 cm wide, and covered in small spines. Green, immature fruits turn bright orange or red when ripe. Just under the spiny skin is a 1 to 2 cm thick layer of yellow to orange flesh called the mesocarp. Beneath this layer, the inner portion of the fruit is filled with numerous (usually 15 to 20) nearly flat (\approx 2 cm wide), brown to black seeds. Each seed is covered by an oily, red membrane/sac (aril), the edible and most nutritious part of the fruit.



Gac is native to South and Southeast Asia.



Gac arils are used for food, medicine and cosmetics. They are also used to make vegetable oil. The seeds have been used in Chinese medicine to treat ailments including boils and mastitis. Oil from the seeds can be used as an illuminant. Young gac leaves and immature (green) fruits are cooked and used as a vegetable in curries and soups



- Gac
- Spiny Bitter Cucumber
- Sweet Gourd
- Giant Spine Gourd
- Cochinchin Gourd



- **Elevation** - 400-1,100 meters
- **Rainfall** - 1,000-3,000 mm (1,500-2,500 mm is optimal). In prolonged dry seasons, irrigation is necessary.
- **Soil** - well-drained with good air circulation (avoid heavy clays) and pH 6.0-7.5 (6.5-7.0 is optimal)
- **Temperature Range** - 14-35 °C (20-30 °C is optimal); gac is tolerant of heat but not frost.
- **Light** - prefers full sun

Gac grows mainly on the edges of forests or rivers, performing best under warm, humid conditions. Due to its ability to generate new growth from root tubers, gac can be grown in areas with dry or cold seasons, as long as the growing season is long enough to form fruit.

Gac can be propagated by seed, vine cuttings or root tubers. Seed can be destroyed with high heat, so avoid seeds from arils that have been dried at high temperatures. Gac seed typically germinates in one to four weeks. Forty percent or more of seed-grown plants may be male, as indicated by the absence of a swollen structure [ovary/immature fruit] at the base of the flowers. By using tubers or cuttings, a farmer can control the number and ratio of male/female plants. For maximum insect-facilitated pollination, aim to establish about 1 male for every 10 female plants. If propagating from vines, make diagonal cuts (of vines from desirable plants) to obtain cuttings 15 to 20 cm long and 3 to 6 mm wide; these can be rooted in water or well-aerated, moist potting media before transplanting to the field.

Since it is a vigorous climber, able to cover entire trees if allowed, give gac vines adequate space (1.5 m within and between rows is suggested). Support the vines with a lattice or trellis, 2 to 2.5 m in height, to minimize spoilage of the soft, ripe fruits. When the main stem reaches the top of the trellis, its growing tip can be removed and laterals selected and trained as desired.

Hand-pollination is not difficult, and may be necessary if insect-pollination is not sufficient. Gac responds well to fertility inputs. It is suggested to use similar rates as for bitter melon (*Momordica charantia*; as described by [Palada and Chang \[2003\]](#)).



Gac will usually flower 2 to 3 months after planting seeds or tubers. Fruits are ready for harvest about 5 months after flowering. It only produces fruit once each year, over a 2- to 3-month season that, depending on the region, falls between September and February in Southeast Asia. Expect to harvest 30 to 60 fruits per plant, with each fruit weighting 1 to 3 kg. Some plants may not produce fruit until the second year after planting.

To save seeds for planting, collect them from fully ripe, dark orange or red fruits. Seeds are more easily separated from the arils after soaking

in water overnight or in a 1:10 bleach-water solution for just a few minutes. The thick seed coat protects the seed from any bleach damage. Seeds should then be air-dried on a counter and stored under cool, dry conditions.



Little information is available about pests and diseases of gac. Rats and birds can damage the fruits. Bitter melon (*M. charantia*), a relative of gac, is susceptible to leaf spot (caused by *Pseudoperonospora cubensis*), bacterial wilt (caused by *Pseudomonas solanacearum*), fruit fly (*Dacus cucurbitae*) and nematodes (*Meloidogyne incognita*).



It is mainly the soft, mature fruits that are harvested and consumed. The spiny outer shell of the ripe fruit is not edible. After cutting the fruit open, the red arils (seed membranes) can be eaten fresh or cooked. With a mild flavor, they can be added to other foods without significantly altering the taste. Gac arils are cooked, for instance, with rice to add nutrition and a natural red coloring to a traditional Vietnamese dish called xôi gac. The arils can also be dried and converted to powder.

Gac arils, and the oil extracted from them, are known for having high concentrations of carotenoids including beta-carotene and lycopene. Beta-carotene is a precursor to vitamin A, which contributes to healthy vision. Gac has been reported to have a concentration of lycopene seven times greater than tomato. Lycopene is an antioxidant with a variety of health benefits. These nutritional benefits can be preserved for year-round use in gac aril oil, which can be extracted using a screw-type press. It takes about 100 kg of fresh fruit to obtain 1 liter of gac oil.



Chuyen, H.V., M.H. Nguyen, P.D. Roach, J.B. Golding, and S.E. Parks. 2015. Gac fruit (*Momordica cochinchinensis* Spreng.): a rich source of bioactive compounds and its potential health benefits. *International Journal of Food Science and Technology* 50:567-577

Ecocrop. [Momordica cochinchinensis](#). Food and Agriculture Organization (FAO), Rome Italy

Herklots, G.A.C. 1972. *Vegetables in South-East Asia*. George, Allen & Unwin, LTD. London.

Minh, N.P. 2014. [Investigation the ratios of antioxidant supplementation into the mixture of GAC \(*Momordica cochinchinensis spreng*\) and carrier to get the highest total carotenoid content during drying](#). *International Journal of Multidisciplinary Research and Development* 1:34-40

Nguyen, H.H. and S.H. Widodo. 1999. [Momordica L.\[Internet\] Record from Proseabase](#). de Padua, L.S., Bunyapraphatsara, N. and Lemmens, R.H.M.J. (Editors). PROSEA (Plant Resources of South-East Asia) Foundation, Bogor, Indonesia. <http://www.proseanet.org>. Accessed from Internet: 27-Feb-2017

Palada, M.C. and L.C. Chang. 2003. [Suggested cultural practices for bitter gourd](#). AVRDC International Cooperators' Guide 03-547, pp. 1-5.

Parks, S., M. Nguyen, D. Gale, and C. Murray. 2013. [Assessing the potential for a gac \(cochinchin gourd\) industry in Australia](#). Rural Industries Research and Development Corporation

Vuong, L.T. and J.C. King. 2003. [A method of preserving and testing the acceptability of gac fruit oil, a good source of B-carotene and essential fatty acids](#). *Food and Nutrition Bulletin* 24:224-230

Wimalasiri, D.C. 2015. [Genetic diversity, nutritional and biological activity of *Momordica cochinchinensis* \(Cucurbitaceae\)](#). Thesis for Doctor of Philosophy, RMIT University