



Annona squamosa: An Insight into the Nutritional Powerhouse and Its Health-Enhancing Properties

*Dhobale Rutuja*¹, Miss. Snehal Lad*², Dr. Gaffar Sayyed*³, Dr. Sanjay Garje*⁴*

¹ Student, SAJVPM, College of Pharmaceutical Science and Research Centre, Kada.

² Assistant Professor, SAJVPM, College of Pharmaceutical Science and Research Centre, Kada.

³ Principal, SAJVPM, College of Pharmaceutical Science and Research Centre, Kada.

⁴ Vice Principal, SAJVPM, College of Pharmaceutical Science and Research Centre, Kada.

Shri Amolak Jain Vidya Parasark Mandals College Of Pharmaceutical Science And Research Center Kada 414202 Ashti Beed Maharashtra India.

Mail:- dhobalerutuja2003@gmail.com

ABSTRACT :

Custard apple (*Annona squamosa*) is a tropical fruit celebrated for its substantial nutritional profile and associated health advantages. It serves as a rich source of vital nutrients, including vitamins C, A, and B6, which are instrumental in enhancing immune function, promoting skin health, and facilitating energy metabolism. Additionally, the fruit is abundant in dietary fiber, which aids in digestion and supports cardiovascular health. Custard apple is also rich in bioactive compounds such as flavonoids, polyphenols, and acetogenins, known for their antioxidant, anti-inflammatory, and anti-aging effects. These properties underscore the fruit's potential role in the management of chronic diseases and its increasing incorporation into skincare formulations. This review emphasizes the nutritional merits of custard apple and its expanding applications.

Keywords : Custard apple, *Annona squamosa*, health benefits, bioactivities phytochemistry: antioxidant.

Introduction :

Custard apples, sometimes referred to as sugar apples or *Annona squamosa*, are a delicious tropical fruit with a distinct sweet flavour and thick, creamy texture. From Southeast Asia to the Caribbean, this green, knobby fruit is revered for much more than simply its delicious flavour. Beneath its rugged exterior is a nutritional powerhouse that makes it a great supplement to a healthy diet in addition to being a delicious snack.

Custard apples stand out in today's health-conscious society when we are always searching for tasty and nutritious foods. Their remarkable nutritional profile includes high levels of important vitamins, including B6 (known to support brain function) and C (which boosts the immune system). This fruit also has a high dietary fibre content, which promotes better digestion, and it has minerals like magnesium and potassium, which are essential for heart health and supporting healthy muscular function.

Custard apples are rich in nutrients, but they are also a great source of antioxidants, which lower the risk of chronic illnesses like cancer and heart disease by preventing oxidative stress in the body. The fruit's inherent anti-inflammatory qualities combined with these antioxidants make it a valuable diet for promoting general health and lifespan.

Properties of custard apple :

Scientific name : *Annona squamosa* L.

Biological Source : Custard Apple is a small, well-branched tree or shrub

Family : The custard apple is a fruit that comes from the Annonaceae family of flowering plants, which is also known as the custard apple family or soursop family.

Geographical Source : It originated in the tropical regions of the Americas and the West Indies, and it was transported to Asia by Spanish explorers on Manila galleons that placed in the Philippines.

VARIETIES :

Cultivars are grouped based on the external fruit colour

A. Red type : Having red color, smaller leaves and fruits.

B. Green type : Having more popularity in India.

1)Balanagar:

- Green skinned fruits with medium size
- High yielding type

2)British Guinea:

- Fruit weight is about 151gm and 37.9% pulp, 17.9% total sugar

3)Mammoth:

- Fruit weight about 183g/ fruit.
- TSS content: 23%, acidity 0.19%.
- Good quality fruit.

4) Barbados seedling:

- Fruits having high sugar content.
- Fruits having green rind, orange yellow margins.
- Late season variety.

5)Red Sitafal:

- This variety originated as a chance seedling.
- Fruits are dark pinkish.
- Having average quality and more number of seeds.

6)Kakarlapahad:

- Very high yielding variety.
- It is very sweet and crispy in nature.

Cultivation And Collection:

Custard apple requires warm and humid tropical climate, with mild winters. The optimum temperature requirement is 20 to 35°C. It can be successfully cultivated from sea level to even 1000M above MSL. A well drained soil is ideal for the crop. Crop is suitable for soils of shallow depth and also saline nature.

Land Preparation : The area should be thoroughly ploughed and 60m³ trenches should be dug. In Goa, it is grown in almost every backyard.

Planting : The pits should be kept open for 2-3 weeks. Later on, 15-20 kg of manure should be mixed with the dug out or top soil and then, filled back into the pit. Well established grafts should be planted in the centre of the pit. Spacing of 5 x 5m can be followed. Staking need to be provided to avoid lodging.

Water Management : Irrigate once in 7-8 days.

Weed Management : Weeding as and when required to keep field clean.

Intercultural Operation : The custard apple flower is hermaphroditic (male and female parts in the same flower) and exhibits protogynous dichogamy (stigmas/ female parts are receptive before the pollen is shed by the anthers), which limits self pollination. Currently hand pollination is mainly used to increase fruit set of low yielding varieties, for manipulation of the harvest period and better quality fruit.

Harvesting : Average yield of 80-100 fruits/tree/year after 4-5 years of planting.

Description :

Morphological Study :

Tree:

The custard apple is a small, semi-deciduous, well-branched shrub or small tree, 3–8 m in height, with thin, gray bark. The crown is spherical or a flattened ball.

Leaves:

The leaves are univalent alternate, lanceolate or oblong lanceolate, 6–17 cm long, sharp or blunt at the tip, and round or widely wedge-shaped at the base.

Flowers:

The flowers are in clusters of two to four, and the length of each flower is about 2.5 cm. The outer petals are oblong, and green and purplish at the base. Inner petals reduce to minute scales, or are absent.

Fruit:

The fruit is round, heart-shaped, ovate or conical, 5–10 cm in diameter, with many round protuberances, greenish-yellow when ripe, with a white, powdery bloom. The white pulp is edible, and has a sweetly aromatic taste. Each carpel holds an oblong, smooth, shiny, blackish or dark-brown seed, ranging in length ranged from 1.3 to 1.6 cm.

Weight:

About 67% of the fruit is edible, and the average fresh weight of a single fruit is around 350 g.

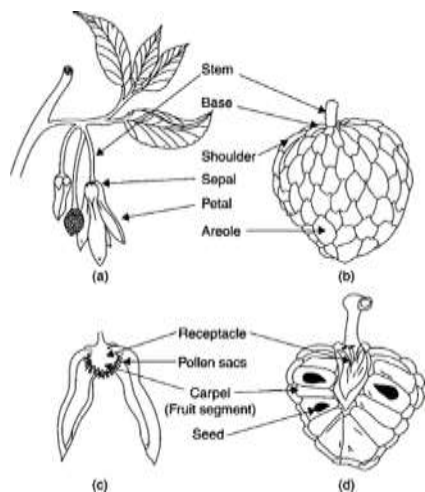


Fig: Morphology squamosa

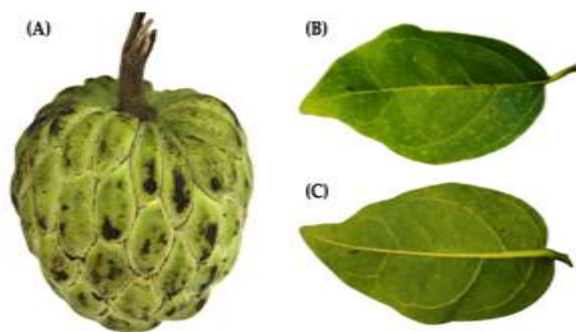


Fig: (A) *Annona squamosa* L. fruit, (B) Dorsal view of *Annona* L. leaves. (C) Ventral view of *Annona squamosa* L. leaves.

Chemical Composition:

The custard apple is regarded as a particularly healthful fruit that is high in energy, fibre, vitamins, and minerals. Minerals including iron, manganese, magnesium, calcium, potassium, and phosphorus are abundant in it. It has somewhat more vitamin C than grapefruit and notable levels of vitamins A, B1, B2, B3, B5, B6, and B9. Additionally, it's a fantastic source of antioxidants and phytochemicals.

| Nutrient | Amount |
|----------------------|---------------|
| Water | 70-80% |
| Protein | 5.2g |
| Ash | 1.9g |
| Calories total | 235 |
| Carbohydrate calcs. | 213 |
| Fat calories | 6.1 |
| Protein calories | 17 |
| Total carbohydrate | 59 g |
| Dietary fibre | 11 g |
| Total fat | 725 mg |
| Saturated fat | 120mg |
| Mono-saturated fat | 285 mg |
| Poly unsaturated fat | 100 mg |
| Omega-6fatty acids | 100 mg |
| Vitamin A | 15 I.V. |
| Vitamin C | 91 mg |
| Nutrient | Amount |
| Thiamine | 275 mcg |
| Riboflavin | 283 mcg |
| Niacin | 2.2 mg |
| Vitamin B6 | 500 mcg |
| Folate | 35 mcg |
| Pantothenic acid | 565 mcg |
| Calcium | 60 mg |
| Iron | 105 mg |
| Magnesium | 53 mg |
| Phosphorus | 80 mg |
| Potassium | 618mg |
| Sodium | 23 mg |
| Zinc | 250 mcg |
| Copper | 215 mcg |
| Selenium | 1.5 mcg |

Table: Chemical Constituents of Custard Apple

Medicinal uses:

The custard apple fruit has several health and medical uses, and the majority of its plant parts - fruit, seed, and leaves appears to contain strong bioactive components. Aponaine, aporphine, coryeline, isocorydine, norcorydine, and glaucine are among the several chemical components that were separated from the plant's leaves, stems, and roots. Many elements of the sugar apple (*Annona squamosa*) tree have been used extensively for millennia by Indian Ayurvedic practitioners to treat diabetes.

Several medical benefits of fruit pulp have been demonstrated, including anti-inflammatory, anti-diabetic, anti-infective, and anti-dyslipidemic effects. Although it is a fruit of the twenty-first century, the pulp is nevertheless difficult to swallow. Several strategies exist to get around this issue and boost intake.

Pineenes, an essential oil, has also been identified and isolated from custard apples. The custard apple differs from other fruit species due to a particular family of compounds called acetogenins. The very long chain fatty acids known as acetogenins are exclusive to the Annonaceae family and are only present in Annonaceous species. Both the in vitro and in vivo research seem to have strong anti-cancer and anti-hypertensive effects.

Anticancer:

Custard apples are thought to possess anti-cancer benefits mostly because of a class of chemicals known as acetogenins, which are unique to Annonaceous species. In vitro tests of acetogenins against 60 different cancer cell types, including breast, prostate, and colon, have been conducted. An acetogenin called bullatacin was 300 times more effective than the common anti-cancer medication paclitaxel, even in an in vivo test system.

Strengthen Immunity System:

The sitaphal fruit, which is rich in vitamin C, aids in the removal of certain toxins and free radicals from the body, protecting it against oxidative damage. Additionally, vitamin C supports the immune system, which protects the body from microbial invasion.

Custard apples are high in calories because they contain simple fructose and glucose, which the body can readily break down and use as fuel. Iron is another ingredient in sitaphal that treats anaemia and gets rid of weakness and sluggishness.

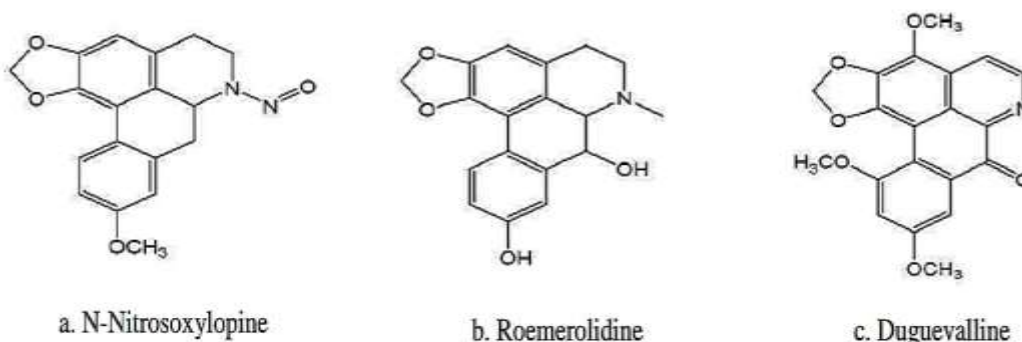
Anti Diabetic:

The custard apple has a low glycaemic index while having a high sugar content. Because of its antioxidant properties, the fruit is excellent for people with diabetes as well. Custard apples appear to mimic insulin in anti-diabetic animal experiments, promoting muscle absorption of glucose and increasing insulin synthesis, resulting in blood sugar concentration stabilisation. Indeed, *Annona squamosa* leaf extract can effectively

substitute lower dosages of externally delivered insulin, and multiple research show that even leaf extracts are helpful at decreasing blood glucose levels.

Anti Malarial:

It has proven possible to treat malaria with custard apples. The bark yielded three recognised aporphine alkaloids. Three compounds - Nitrosoxylophine, Roemerolidine, and Duguevalline were recognised by their structures. The three anti-malarial alkaloids demonstrate a moderate level of effectiveness against two strains of *Plasmodium falciparum*: the chloroquine-sensitive strain and the chloroquine-resistant strain.

**Promotes Quicker Wound Healing:**

The high vitamin C content of custard apples boosts the immune system, which promotes quicker wound healing.

Treats Skin Infections:

Rich in minerals that improve skin, including zinc and copper, B6, and C, the Custard Apple is a veritable gold mine of skin-beneficial elements. Strong nutrient solutions for acne, allergies, abscesses, and other skin-related disorders help prevent and treat a wide range of long-term skin issues.

Antioxidants are abundant in custard apples. These may protect skin cells from harm, resulting your skin looking younger and brighter. Additionally, they could minimise the visible appearance of wrinkles and other ageing signs.

Also, Custard apples include a sufficient amount of vitamin A, which is essential for generating collagen and building muscle. Therefore, including this vitamin in your diet can strengthen and increase the elasticity of your skin.

Antimicrobial:

Numerous chemicals, including Ent-kauranes, Acetogenins, essential oils, and benzyloisoquinoline alkaloids, have been demonstrated to exhibit antimicrobial properties in the fruit of *Annona squamosa*.

Enhances Eye Health:

Vitamin A and a wealth of antioxidants are found in custard apples, or sitaphal, which are important for maintaining healthy eyes. These minerals improve vision and eyesight and postpone or lower the risk of developing macular degeneration due to old age, cataracts, and glaucoma by regulating blood circulation in the body, especially to the optic nerves.

Cardiovascular activity:

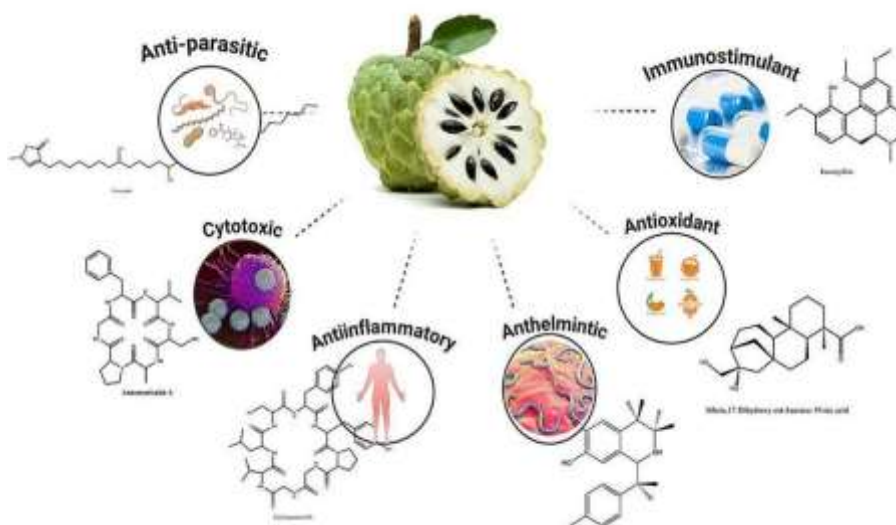
Rich in heart-healthy omega-6 fatty acids and unsaturated fats, sitaphal fruits act as a powerful fortifier to strengthen the heart by preventing cardiovascular diseases, which prevent heart attacks and strokes.

Anti HIV:

It has anti-HIV qualities as well. Out of the 14 compounds that were identified in the investigation, 16, 17-dihydroxy-entkauran-19-oic acid had valuable effectiveness against HIV replication in H9 lymphocyte cells, with an EC50 value of 0.8 µg/ml. Considering the benefits of these species, concerted efforts must be undertaken to promote the growing of neglected plants. Very few of these species performed better than all others, even going up against locally grown crops that have been cultivated for generations, and have given farmers steady revenue. This fruit has a lot of medical benefits.

Improves Brain Activity and Function:

Vitamin B, which is found in custard apples, relieves the symptoms of depression and feelings of sadness by stimulating the brain to maintain appropriate functioning of processes like nerve signalling that improves focus.

**Conclusion :**

We have oral traditions of these plants documented and recognised pharmaceutical uses. This review is meant to clarify the significance of *Annona squamosa* L. in the field of herbal medicine. The properties are presented along with studies on its phytochemistry and pharmacology. Antimicrobial, Antioxidant, Anticancer, Improve Immunity system, Antidiabetic, Antimalarial, Skin infection, Cardiovascular activity, and Anti-HIV are only a few of the listed benefits. Numerous studies on this plant that grows have demonstrated its great potential for enhancing pharmaceutical products, and further research is needed to fully realise its promise as a natural remedy.

References:

- Aragão, F. A., Lima, M. M., Marques, E. J., & de Oliveira, R. S. (2018). Phytochemical composition and antioxidant properties of *Annona squamosa* L. fruit extracts. *Journal of Agricultural and Food Chemistry*, 66(6), 1342-1350. <https://doi.org/10.1021/jf803212a>
- IIVR (Indian Institute of Vegetable Research) 2013. *Vision 2050*. Pp 1.
- IARI (Indian Agriculture Research Institute) 2013. *Annual report 2012-2013*. Pp 19.
- Johns, H. A. and Clarke, A. E. 1943. The story of hybrid onion. *Proc. Am. Soc. Hort. Sci.* 43: 189-194.
- Jones, H. A. and Emsweller, S. L. 1936. A male sterile onion. *Proc. Am. Soc. Hort. Sci.* 63: 443.
- Kaloo, G. 1988. *Vegetable Breeding*. Vol. I. CRC Press, Inc., Florida. 23 p.
- Kitagawa, J., Gerrath, J., Posluszny, U. and Wolyn, D. J. 1994. Developmental and morphological analysis of homeotic cytoplasmic male sterile and fertile carrot flowers. *Sex. Plant Reprod.* 7: 41-50.
- Morton, J. F. (1987). *Fruits of warm climates*. Florida Flair Books
- National Center for Biotechnology Information (NCBI). *Annona squamosa: Phytochemical and pharmacological research*. <https://www.ncbi.nlm.nih.gov>

-
10. Saha, P., Mazumdar, U. K., Haldar, P. K., & Gupta, M. (2011). Antioxidant and anti-inflammatory properties of *Annona squamosa* extract in rats. *Journal of Pharmacy and Pharmacology*, 63(8), 1104-1112. <https://doi.org/10.1111/j.2042-7158.2011.01302.x>
 11. Singh, A. (2020). *Tropical fruits: Biology, agriculture, and uses*. CRC Press.
 12. Sharma, R., & Singh, D. (2000). Cultivation and harvesting of custard apple (*Annona squamosa* L.). *Indian Journal of Horticulture*, 57(1), 12-18.
 13. U.S. Department of Agriculture (USDA). (2021). National nutrient database for standard reference: *Annona squamosa* (custard apple) nutritional values. U.S. Department of Agriculture. <https://fdc.nal.usda.gov>