



A Review on Custard Apple Having Anti-Headlice Property

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Abstract-

Modern medicine has substantially improved thanks to the chemistry of natural products. The nutritionally dense fruit known as the custard apple (*Annona squamosa*) is primarily prized for its flavor. It has a known active ingredient that kills head lice. The goal of the investigation is to determine the photochemical properties and chemical composition. Seed oils that have undergone standard GC analysis have a variety of essential oils that primarily support their anti-inflammatory, anti-cancer, and anti-microbial properties. In order to produce biological lubricants, custard apple seeds were examined for their physicochemical properties. Research revealed that the seeds contained 27.5% oil. Paint and soap manufacturers use seed oil. Custard apple seeds are poisonous, yet due to their insecticidal qualities, they are used to treat head lice. *Annona* seeds contain insecticidal qualities

Keywords- Custard apple, Anti-Head lice, sugar apple, sitaphal, custard apple seeds

Introduction-

One of the most significant, tasty, and nutritious acid fruits is the custard apple, formally known as *Annona squamosa* L. Genus *Annona* and species *reticulata*, and primarily valued for its dessert and confectionery uses. The genus *Annona*, which has more than 120 species, is a common plant food in India. *A. Squamosa* has been employed in traditional medicine as well as numerous other applications including the development of food products, such as the use of the fruit pulp as a juice or a flavoring agent. There are a lot of seeds, peels, and seed coatings produced by custard apple industrial processing operations. The non-edible portion of the fruit—the seeds—are thrown out as garbage, leaving the seeds unused. There are several beneficial bioactive compounds in the custard apple waste (seed) Thus, it is possible to extract seeds, which could result in significant revenue for the food processing companies. The seeds have been used to create a hair tonic to get rid of head lice in India. Recent research has demonstrated that various plant parts, such as seeds, leaves, husks, peels, and seed coats that are left over after the primary harvesting, are rich sources of phytochemicals and nutrients and can be used for the development of novel products, including those for the food and pharmaceutical industries. *A. squamosa* has yielded more than 400 active chemicals. Recent research on the pharmacological and phytochemical properties of *A. squamosa* seeds has established that the main chemical components that are active are announced acerogenins and cyclopeptides. The average fruit may contain between 50 and 75 seeds overall, or even more. Some trees, though, produce fruit without seeds. March to July is the time for flowering, and August to January is when fruit is produced (Pathak and Zaman).

History-

Sitaphal is believed to have appeared in the WEAST INDIES, although it was first introduced to Mexico through central America. Later, Peru and Brazil began cultivating it, although it is now most frequently grown in the Bahamas, with sporadic expansion into Bermuda and Florida. Portuguese traders brought it to tropical Africa. In addition, there is great discussion regarding how it arrived in India. Although Sitaphal was already cultivated in India, according to *Ain-e-akbari*, the 16th-century documentation of Mughal emperor Akbar's realm, the Portuguese brought this fruit with them when they arrived in India. It is stated that during Sita's time being captured by Ravana, a drop of her tear gave birth to the "Sitaphal" tree in the jungle.

The pulp is sweet tasting and has a custard-like appearance, earning the name "CUSTERD APPLE." The old Mexican name "ATE" is where the Bengali name "ATA" and the Nepali name "ATI" originate.

SITA, Lord Rama's wife, is the source of the Hindi name "SITAPHAL." Another theory holds that it derives from the Sanskrit words "Sita," which means "Cold," and "Phal," which means "Fruit." Sitaphal is regarded to have medicinal significance for meditation in ancient India.

According to a contentious claim, traders who imported "Custard apples" to India gave them the name "Sita" in order to sell them.

Custard apples are now grown in several regions around the world and are famous in Bengal as well as India.

Key features for custard apples/ Traditional Uses-

Medical uses of *Annona squamosa* (sitaphal) include its use as an insecticide and for its anti-inflammatory, anti-diabetic, anti-epidemic, and anti-tumor characteristics. These effects may be attributed to the plant's existence of cyclic peptides. To combat the palpitations and heart failure, prepare a 1 liter of water infusion with two handfuls of fresh leaves. This infusion is too potent for healthy digestion and contains anti-pasmodic properties.

The seeds of sitaphal contain anti-parasitic properties (against lice). Before employing *Annona squamosa* seeds for the hairs, they are formed and cooked over a water bath for three hours.

In India, crushed leaves are applied topically to sores and ulcers, and the leaves are also consumed orally as a decoction (technique of extraction in which ingredients are boiled especially in medicinal formulation derived from a plant). To treat poisoning and stop diarrhea, the bark decoction is administered. In the tropical America region, leaf decoction is used as a febrifuge, poisonous, digestive, emmenagogue, cold cure, or to clarify/refine the urine. To relieve rheumatic discomfort, baths can also be filled with *Annona squamosa* leaf decoction. The aqueous extract of the leaf improved the actions of plasma insulin and decreased blood glucose and lipid peroxidation levels.

Various Usage for Plant Parts

Leaves-

When crushed to powder, leaves can be used to eliminate cattle lice and to extract guinea worms from soil. It is only frequently used in perfumery. Hysteria, anal prolapse, and fainting spells can always be treated using sitaphal leaves (sudden and temporary loss of consciousness).

Fruit-

Fruits from the *Annona squamosa* are quite healthy, and a tumor can be treated with crushed ripe fruit mixed with salt. Formulas work as an expectorant, astringent, and a cooling agent, and they also treat anemia and searing pain. Fruit is regarded as a beneficial toxin in Ayurveda and aids in improving blood as well as building muscle and strength.

Bark-

Strongly astringent and poisonous, bark. Bark extract has been used for decades to stop diarrhea, and a decoction of bark has been used to provide a toxic anti-cancer.

Seed-

The seeds of *Annona squamosa* are used as fish poison and have hypotensive and anti-inflammatory properties. Additionally, the seed extract exhibits RBC hemolysis and anti-tumor analgesic action. If seeds are combined with gramme flour, they can be used to remove lice from hair, and seeds also make an excellent hair wash.

Root-

Annona squamosa roots are used as a purgative to treat diabetes, spinal marrow disease, and diarrhea.

Tree-

A useful and essential source of firewood is the *Annona squamosa* tree. Insects that excrete milk need trees as a host. As attractive trees, trees flourish in gardens.



Proximate Composition of Custard Apple Seeds

Fatty Acid Composition of Sugar Apple Seed Oil

S. No	Composition Fatty acid	% Weight
1	Lauric acid (C12:0)	0.08
2	Palmitic acid (C16:0)	17.79
3	Stearic acid (C18:0)	4.29
4	Oleic acid (C18:1)	39.72
5	Linoleic acid (C18:2)	29.13
6	Arachidonic acid (C20:4)	1.06
7	Linolenic acid (C18:3)	1.37
8	Behenic acid (C22:0)	2.01

**Table-1 Fatty Acid
Apple Seed Oil**

**Phytochemical
Apple Seeds**

Composition of Sugar

Profile of Custard

Cyclopeptides and annonaceous acetogenins were found to be the main components in the seeds of *A. squamosa*, according to phytochemical studies. Numerous phytochemicals including alkaloids, including aporphine, norcorydine, roemerine, corydine, glaucine, anonaine, and norisocorydine, are present in various regions of *A. squamosa*. Acetogenins (polyketides) were discovered in the seeds of *A. squamosa*, including annotemoyin-1 and -2, cholesteryl, coumarinoligans, glucopyranoside, squamocin, and squamocins B-N. It has been proven that custard apple seeds are poisonous, however they are employed as a bio pesticide or an insecticide (the preparation of the seeds may irritate the eyes, causing corneal injury). Custard apple seeds have a high oil content and can be used to make soap or, after treatment, as a substitute for cooking oil. 12,15-cis-squamostatin-A, bullatacin, -caryophyllene, -pinene, anonaine, camphene, spathulenol, germacrene, squamocin, duvariamicin-III, myrcene, lirioidenine, annonacin, and molvizarin are just a few volatile compounds found in seeds. In a study, Fourier-transform infrared (FTIR) analysis was used to identify the phytochemicals found in the seed extract of *A. squamosa*. The investigation's findings indicate that the methanolic seed extract of *A. squamosa* contains amines, carboxylic acids, thiocarbonyl esters, phosphine oxide, phosphate, organosilicon, quinone or conjugated ketone, imines, oximes, nitro compounds, amides, nitrous compounds, sulfone, aromatics, sulphate ester, alkyl halides, phosphorus. Numerous acetogenins, including squamocin, annonacin, and annonacin VI, as well as cyclopeptides, including cyclosquamosin A and B and cyclosquamosin H, were found in the seed extract of *A. squamosa*, according to an analysis using atmospheric pressure chemical ionization mass spectrometry (APCI-LC-MS). In earlier research, squamocin and annonacin, which are found in the seeds of *A. squamosa*, were discovered to have therapeutic characteristics. This suggests that these chemicals have a significant part in the insecticidal, anti-inflammatory, and anticancer effects. *A. squamosa* seed extract was examined for phytochemical screening using several solvent systems, including petroleum ether, water, and methanol.

Pharmacological Properties of Custard Apple Seeds

The considerable nutraceutical and phytochemical content of custard apple seeds has recently made them a promising element for the creation of supplemental



Fig.1 Custard apple fruit and its seed by-products.

Diets. However, by incorporating the bioactive components from the custard apple seeds, by-products have been developed that have unique pharmacological effects. The custard apple seed, also known as *A. squamosa*, has been thoroughly researched for its antibacterial, anti-diabetic, anti-inflammatory, anti-cancer, anti-tumor, antioxidant, hepatoprotective, antiproliferative, antiheadlice, antihelminthic, and antiviral activity.

Variety/Region	Activity	Extract/Solvent Used/Concentration	Study/Cell Line/ Animal Model	Key Finding
Annona squamosa seeds	Anti headlice	Petroleum ether seed extract	In vitro	Petroleum ether extract along with coconut oil (1:1), kills 90% of lice
Annona squamosa seeds (Pak Chong, Thailand)	Anti headlice	Hexane seed extract	In vitro against headlice	Seed extract contains oleic acid and a triglyceride with one oleate ester that kills lice in 11–49 min

Medicinal Properties of Custard Apple

A. Antioxidant Activity

The antioxidant activity in mature fruits of 36 Taiwanese species and varieties was assessed using the ferric reducing antioxidant power (FRAP) assay in the Taiwanese study (Chen et al., 2006). Sugar apple was classified as having very high antioxidant activity in this study, with >70mmol/100g edible part. Many studies, including those conducted in India (Wongs-Aree et al., 2011, Kaur et al., 2003), have demonstrated that extracts of *Annona squamosa*, *Annona cherimola*, and *Annona muricata* have high anti-oxidant activity.

B. Effects on Cardio-vascular Disease

Hole et al. investigated the effect of an aqueous extract of the fruits on isoproterenol-induced myocardial infarction in rats. Custard apple pulp pretreatment reduced myocardial damage (Hole et al., 2006). A quarter of a normal sized custard apple consumed daily by an 80 kg human exhibited cardio protective effects comparable to therapeutic doses of captopril (Kaleem et al., 2006). In another study, custard apple pulp (2.5-5.0 g/kg body weight) reduced total cholesterol levels by 46 percent in normal rabbits and 32.4 percent in diabetic rabbits with increased HDL-cholesterol (Gupta et al., 2005). The rabbits' triglyceride/ HDL ratio, which is a significant predictor of heart disease in humans (Gazino et al., 1997), was cut in half. (Beppu et al., 2009) demonstrated that oral administration of ethanol extracts of fresh custard apple fruit significantly reduced plasma levels. 65 percent of mice fed a moderately high fat diet for four weeks had higher triglyceride levels, and exhibited a potent adipogenesis inhibitory effect, reducing fat tissue by approximately 20%. The anti-dyslipidemic effect is important in the prevention of cardiovascular morbidity.

C. Anti-HIV Properties

Among the 14 isolated compounds studied, 16,17-dihydroxy-entkauran-19-oic acid demonstrated significant activity against HIV replication (Wu et al., 1996) in H9 lymphocyte cells with an EC50 value of 0.8 g/MI.

D. Antidiabetic Properties

In rabbit studies, 5 g of semi-dried pulp of sugar apple per kg of body weight was found to be effective as an anti-diabetic supplement. In humans, this equates to eating one-eighth of a normal custard apple. The most likely mechanism could be due to increased Insulin sensitivity Custard apple appears to mimic anti-diabetic effects in animal studies. Insulin stimulates its production and increases the uptake of glucose by muscles, resulting in Blood sugar concentrations are stabilized. In fact, leaf extracts are also useful in Lowering blood glucose levels, and several studies show that *Annona squamosa* leaf Extract can effectively replace lower doses of externally administered insulin.

E. Anticancer Properties

The anti-cancer properties of custard apple appear to be primarily due to a class of compounds known as Acetogenins, which are unique to Annonaceae. Acetogenins have been shown to be effective against 60 different types of cancer cells in vitro. Breast, prostate, and colon cancer are just a few examples. When compared to the standard anti-cancer drug paclitaxel, Even in an in vivo test system, bullatacin, an acetogenin, was 300 times more potent. Annonaceous acetogenins also inhibit complex I enzymes in the mitochondrial electron transport system. They also inhibit the NADH oxidases found in the plasma membranes of tumor cells. The Acetogenins inhibit MDR (Multi Drug Resistance) expression and induce apoptosis of cancer Cells. Bullatacin extracted from custard apple is 258 times more cytotoxic against breast cancer cell than Adriamycin.

F. Anti-infective

The fruit of *Annona* spp. Has been shown to have anti-microbial properties due to a variety of compounds including Ent-kauranes, Acetogenins, essential oils, and Benzylisoquinolines alkaloids. The crude methanol extract of sugar apple and an isolated deterrent Are being tested for anti-bacterial activity against *Staphylococcus aureus* and *Streptococcus pneumonia*. There have also been Reports of chemicals that are active against *Candida albicans*, proteus, and other pathogens (Wiat et al., 2005).

G. Other Properties

Other than the fruity part of the plant, other parts of the plant have been found to be medicinal. In vivo, aqueous extracts of *Annona Squamosa* seeds demonstrated significant antitumor activity against AK-5 tumor. Gupta et al. in 2005 found that feeding sugar Apple pulp to animals increased

haemoglobin levels by up to 21%. The bark of *Annona* species has been used to extract roemerolidine and duguevalline alkaloids. They demonstrated moderate Antiplasmodial (Antimalarial) activity with no cytotoxicity. Alkaloids, Dopamine, Salsolinol, and Coclaurine are also found in the Leaves and stems. Magnesium aids in the maintenance of the body's water balance. It may benefit arthritic patients by removing acids from joints. Custard apple contains copper, which helps with constipation.

Conclusion

The popularity of *A. squamosa* has grown as a result of recent increases in research and studies on the bioactivities and health benefits of various plant components, including the seeds, bark, leaves, and fruits. *A. squamosa* has been used in traditional folk medicine all over the world, and as 50–80% of the fruit can be eaten, it is probably used in the food sector as well. The pulp includes significant amounts of potassium, salt, dietary fibre, vitamin B1 (thiamine), and other nutrients that are utilised to flavour ice cream. Polyketides, annonaceous acetogenins (neurotoxins), cyclopeptides, carbohydrates, proteins, lipids, oleic acid, and linoleic acid are just a few of the phytochemicals that can be found in abundance in the seeds of *A. squamosa*. *A. squamosa* seed extracts were discovered to be efficacious in a number of bioactivities, including antitumor, antimicrobial, antifungal, antidiabetic, anti-headlice hepatoprotective, anticancer, and antifertility, based on in vivo and in vitro tests. *A. squamosa* seeds' phytochemical composition and the molecular basis for a number of their bioactivities have been the subject of a few investigations. To ascertain the seeds' potential as a nutraceutical and food supplement, more pharmacological research must be done. Considering the research that are currently available, it is expected that *A. squamosa* seeds will be used as a component in the cosmeceutical and process industries, particularly as anti-headlice medications and Anti-Dandruff, with the goal of improving human health.

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