IJAER/June-July 2013 /Volume-02/Issue 4 ISSN: 2278-9677

International Journal of Arts & Education Research

# EFFECTS OF ANNONA SQUAMOSA SEEDS EXTRACT ON THE HISTOLOGY OF FAT BODIES AND MORPHOLOGY OF DYSDERCUS KOENIGII

**Dr. Kalpana Sharma**

Associate Professor,Department Of Zoology

Govt. College , Ajmer

## ABSTRACT

The Annona squamosa L. fruit tree, which belongs to the family Annonaceae, has been used to a variety of applications for centuries. The evergreen plant known as A. squamosa is most often found in tropical and subtropical areas of the world. Candies, ice creams, and drinks are just some of the many uses that make considerable use of srikayas, which are the fruits of the A. squamosa plant. Different parts of the A. squamosa plant have been attributed to a broad variety of traditional medical purposes, including those of tonic, apophlegmatisant, cold medicine, abortient, and heart sedative, among others. Anticancer, anti-oxidant, antidiabetic, antihypertensive, hepatoprotective, antiparasitic, antimalarial, insecticidal, microbicidel, and molluscicidal actions have all been reported to be present in A. squamosa, according to the findings of a number of studies conducted on the genus. Investigations into the phytochemistry of A. squamosa have focused on the primary components, which have been identified as annonaceous acetogenins (ACGs), diterpenes (DITs), alkaloids (ALKs), and cyclopeptides (CPs). Up till the year 2012, there were a total of 13 CPs, 33 DITs, 19 ALKs, and 88 ACGs recorded from this species. As a result of the numerous studies that have been conducted on A. squamosa, the purpose of this review is to attempt to integrate the information that is currently available on its phytochemicals, folkloric uses, and bioactivities in the hopes of promoting a better understanding of its therapeutic values.

***Keywords:*** *Annona squamosa seeds, morphology*

## INTRODUCTION

In addition to the vital position that they play in photosynthesis, plants may also be used in the production of natural goods. Since the beginning of medicine, people have been turning to natural items for assistance in maintaining their health. Over the course of the last century, the phytochemicals and active components found in plants have been an essential component in the invention of new pharmaceuticals. Significant interest in the bioactivities of substances has been sparked in recent years as a direct result of the significance

of the bioactive components of plants in the fields of medicine and agriculture (Moghadamtousi et al., 2012). In spite of research conducted on a limited number of plant species, it has become clear that the conventional wisdoms surrounding plants and their function in the natural world are woefully insufficient. Because of this, it is necessary to do comprehensive research on the bioactivities of these plants and the phytochemicals that are essential to them in order for natural product development to progress in a fair manner (Moghadamtousi et al., 2012). In the area of pharmaceutical research, plants that have a long history of use in enthnomedicine are a great resource of active phytoconstituents. These phytoconstituents give therapeutic and health advantages against a wide variety of diseases and conditions (Li et al., 2012; Moghadamtousi et al., 2012; Xiao et al., 2012). A. squamsoa is one of these plants that has a significant amount of traditional use. The phytochemicals and bioactivities of A. squamosa are broken down in this review that we have written.

Biological Specifications and Geographical Extent

Annona squamosa L. is a member of the Annonaceae family, which consists of roughly 135 genera and 2300 species. It is also known as sugar apple, custard apple, sweet sop, sweet apres, and sitaphal (Raj et al., 2009; Srivastava et al., 2011). It is unknown where A. squamosa first appeared in the world. It is a tree that changes its leaves seasonally and may be found across the tropical regions of South America and the West Indies. It is believed that the Spaniards brought seeds from the New World to the Philippines, and it is believed that the Portuguese brought the sugar apple to southern India around 1590. (Morton, 1987). These days, it is planted in climates that may be classified as either tropical or subtropical all over the globe.

The evergreen A. squamosa tree may grow to a height of between 3 and 8 metres. Leaf oblong lanceolate or lanceolate, 6–17 centimetres long and 3–5 centimetres wide, alternately arranged on short petioles; bark thin and grey; flower greenish, fleshy, drooping, extra-axillary, more on leafy shoot than on the older wood and tending to open as the shoot elongates; fruit can be round, heart-shaped, ovate, or conical, 5–10 cent

Ethnopharmacology

All parts of the A. squamosa tree, which is comparable to other species of the same genus, have a long history of usage in traditional ethnic medicine for the treatment of a broad range of maladies and diseases affecting humans, including cancer and parasitism (Gajalakshmi et al., 2011). According to Ayurveda, srikayas, which are the fruits of the A. squamosa tree, are an effective tonic. It was said that srikayas have the ability to improve the quality of blood as well as the strength of the muscles. It may also be used as an apophlegmatisant, and it can help chill the body, ease the sensation of burning, and reduce the inclination toward biliousness. Additionally, srikayas calm the stomach and prevent vomiting by acting as a sedative on the heart (Vijayalakshmi and Nithiya, 2012). In Yunani medicine, the seeds are regarded as having the

ability to induce abortions and as being effective in ridding hair of lice. The seeds produce an oil and resin that may be used as a disinfectant, and when combined with gramme flour, the powder can be used as a shampoo (Gajalakshmi et al., 2011). In the southern part of China, an extract made from the seeds was traditionally used as a treatment for "malignant sores" (cancer) (Wu, 2004). Because seeds are such a potent irritant to the conjunctiva, they have the potential to cause ulcers in the eye. Seeds were shown to be effective in curing corneal injuries in many research investigations conducted in our lab. Poultices prepared from the leaves are used to treat boils and ulcers, and an infusion made from the leaves has been shown to be effective in treating prolapse in children. For the purpose of guinea-worm extraction, a cataplasm consisting of crushed leaves and salt is often used (Gowdhami et al., 2012). Leaves are traditionally used in Cuban medicine to treat high levels of uric acid. Treatments for diarrhoea and dysentery included the use of the plant's leaves, bark, and unripe fruit (Kirtikar and Basu, 1918). The folkloric record reported the use of A. squamosa as an insecticidal, an anticancer agent, an antidiabetic agent, an anti-oxidant agent, an antilipidimic agent, and an anti-inflammatory agent; modern research have verified these uses.

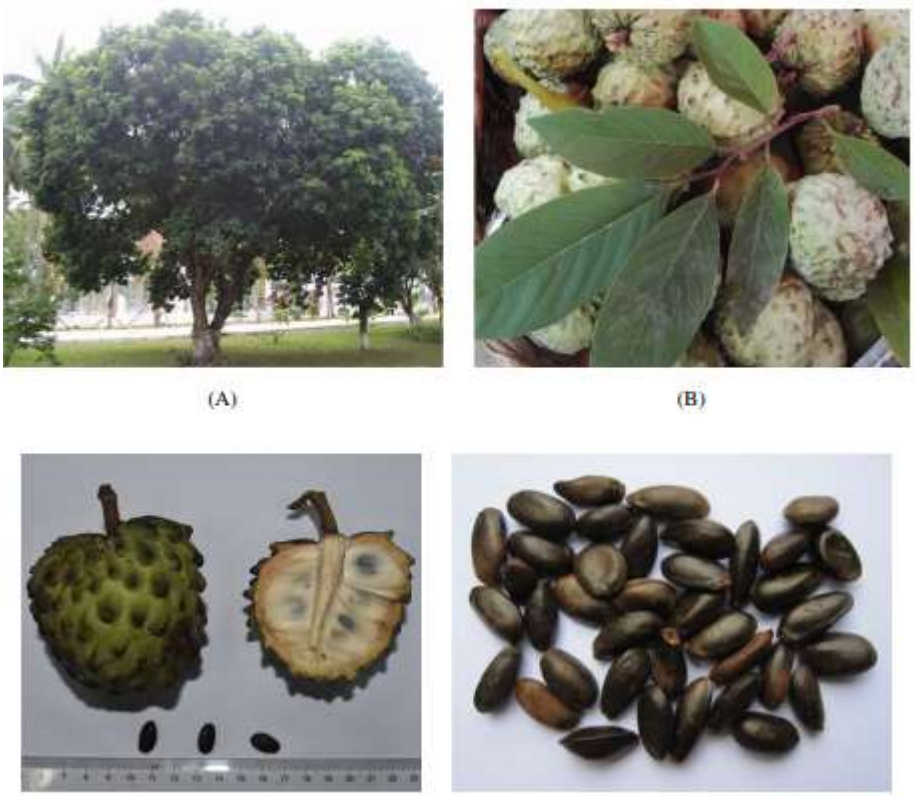



**Figure 1. Annona squamosa L. (A); the physical characteristics of the leaves (B), fruits (C), and seeds (D); and (D)**

**Phytochemistry**

Extensive phytochemical analyses conducted on various parts of the A. squamosa plant have shown the existence of a wide variety of phytochemicals and components. Some of these compounds and phytochemicals include essential oils, cyclopeptides, annonaceous acetogenins, and diterpenes. Figures 2–5 illustrate the chemical structures of the most important chemicals that have been identified from A. squamosa L. Up till February 2012, this species has produced 33 DITs, 19 ALKs, 88 ACGs, and 13 CPs that were successfully isolated.

**Diterpenes**

The only portions of A. squamosa that do not contain DITs are the seeds and the leaves. However, DITs are widespread and abundant throughout the rest of the plant. At the moment, there have been a total of 34 DITs isolated from this species, the vast majority of which are entkaurane DITs (Fig. 2). Against lung and ovarian cancer cells, many DITs derived from barks exhibited potential anticancer activity.

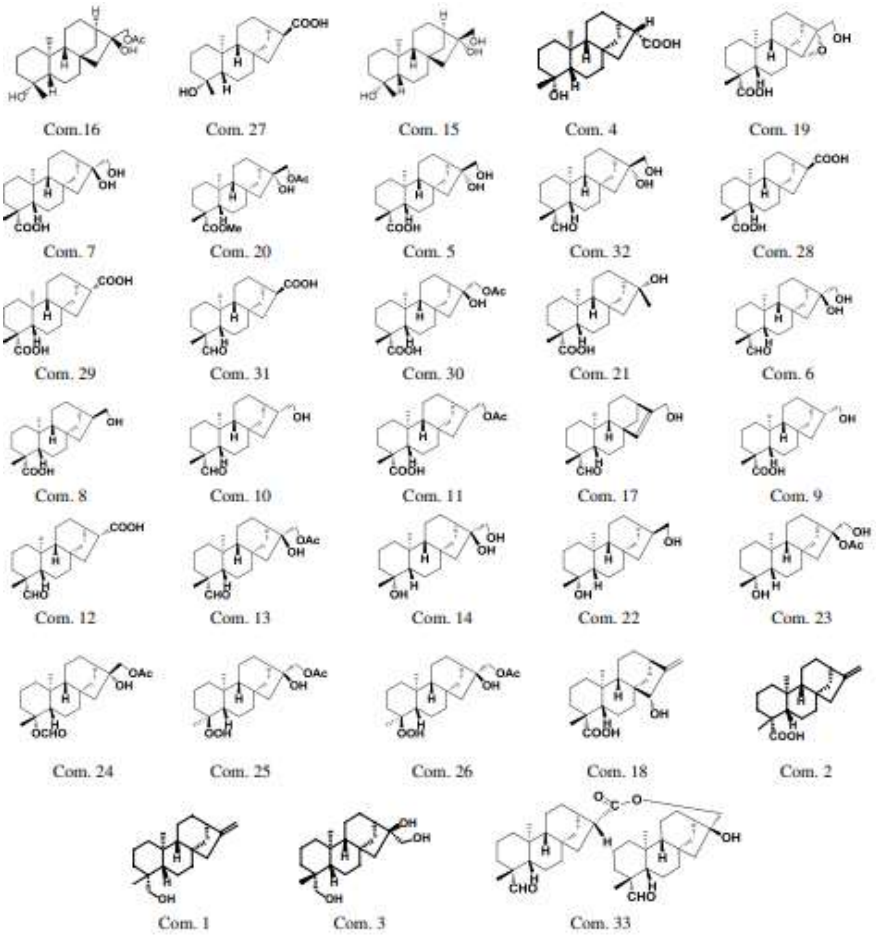
**OBJECTIVES**

**1. to do research on squamosa seeds.**

**2. to get knowledgeable in morphology.**

**Alkaloids**

ALKs are a group of chemicals that were first reported to come from A. squamosa. However, only 19 different alkaloids were extracted from the A. squamosa plant. The vast majority of these were aporphine ALKs, and they were isolated from either the leaves or the stems of this plant. The antihypertensive, antispasmodic, antihistaminic, and bronchodilatory effects of ALKs derived from A. squamosa were thought to be the bioactive ingredients in this plant.




**Cyclic Peptides**

Cyclic peptides are a special kind of cyclic protein that belong to their own family and are distinguished from other cyclic proteins by the fact that they do not adhere to the topological simplicity criterion. Not only does this cyclotide family of proteins have a distinctive amide head to tail cyclized peptide backbone, but they also incorporate a cystine knot, which is a structure in which an embedded ring in the structure is formed by two disulfide bones. This family of proteins is found in high abundance in the plant families Rubiaceae and Violaceae. Because of the combination of these properties of the cyclic cystine knot, a one-of-a-kind protein structure is produced. This fold is topologically complicated, and it has extraordinary chemical and biological stability (Craik et al., 1999). Due to the presence of cyclic peptides, the traditional uses of A. squamosa have been defined as being insecticidal, an anticancer agent, antidiabetic, anti-oxidant, anti-lipidimic, and anti-inflammatory agent (Gajalakshmi et al., 2011). In addition, CPs were described in the literature on A. squamosa, which mentions a number of successful pharmacological actions.

Essential Oil

GC-MS examinations of the leaf oil of A. squamosa, which had been gathered from the North Indian Plains, revealed the presence of primarily sesquiterpenes, with -caryophyllene and germacrene D serving as the two

most important components (Garg and Gupta, 2005). The principal discovered components in the leaf oil of A. squamosa that were found to be (E)-caryophyllene (27.4%), germacrene D (17.1%), and bicyclogermacrene (10.8%), according to a research that used samples gathered in Brazil (Meira et al., 2012). Caryophyllene oxide (29.38%), kaur-16-ene (19.13%), germacrene D (11.44%), bisabolene (4.48%), and 1H-Cycloprop(e)azulene (3.46%) were found to be important components of the volatile oil found in A. squamosa bark oil, according to the findings of another experiment (Chavan et al., 2006). A significant amount of monoterpenes, such as pinene, sabinene, and limonene, was discovered to be present in the essential oil that was extracted from the fruit pulp.

Biological Activities

Numerous investigations on extracts of the plant's numerous sections and on its separated ACGs shown substantial antiproliferative activity against many distinct cancer cell lines. However, the fundamental mechanism of anticancer activity was only demonstrated by a few number of studies.

Efforts Made to Fight Off Parasites

Protozoal illnesses are a significant category of international issue that impact millions of individuals all over the globe. The protozoal infections that cause leishmaniasis, sleeping sickness, as well as Chagas disease and malaria, respectively, are caused by protozoa belonging to the genera Leishmania, Trypanosoma, and Plasmodium, which are the most common and widespread of all illnesses (Glaser and Holzgrabe, 2012). The creation of medications that are resistant to those identified via empirical research is a significant barrier in the way of the treatment of protozoal illnesses. In addition, toxicity and a number of adverse effects, especially when combined with long-term use, have made the therapies that are now accessible increasingly undesirable (Moghadamtousi et al., 2012). Because they don't pose much of a threat to mammals, natural extracts are an excellent and risk-free option. To determine A. squamosa's cytotoxicity as a natural agent, it has been tested on a variety of pathogenic parasites. Trypanosoma cruzi was inhibited by the essential oils derived from A. squamosa, which were shown to be antimicrobial. There was evidence of trypanocidal action with IC50 values lower than 15 micrograms per millilitre. The antiprotozoal activity of A. squamosa pericarp was shown to be less effective against Haemaphysalis bispinosa, Hippobosca maculate, and R. microplus, according to a study (Madhumitha et al., 2012). A bioassay-guided research project on the seeds of A. squamosa was conducted against Meloidogyne incognita and Bursaphelenchus xylophilus, and the results of this study led to the identification of eight bioactive ACGs. There was substantial activity seen in three of these. Two different strains of Leishmania chagasi were put up against an ALK and an ACG that were extracted from certain plants. When tested against promastigotes, the IC50 value for ALK was shown to be 23.3 g/mL.

Antimalarial

Activity Malaria, which is often considered to be one of the most debilitating illnesses, affects a significant amount of the world's population, particularly in Africa (Murray et al., 2012). Due to the fast spread of malaria, the antimalarial medications that are now available display varied degrees of failure. In the meanwhile, there is only a small arsenal of antimalarial medications that are commonly used to treat falciparum malaria (Winstanley, 2000). There is a clear and present need for a novel medicine that is also reasonably priced. An encouraging antimalarial activity was observed with IC50 values of 2 g/mL and 30 g/mL, respectively, when the methanolic extract of leaves was tested against two strains of Plasmodium falciparum: the chloroquine (CQ) sensitive strain 3D7 and the chloroquine (CQ) resistant strain Dd2. While the stem bark had a lesser level of activity, with IC50 values of 8.5 and 120 micrograms per millilitre, respectively (Tahir et al., 1999). Other tests on the bark methanol of A. squamosa verified the previously observed toxicity against CQ sensitive strains (3D7 and D10) of P. falciparum as well as a CQ resistant strain (Dd2) (Johns et al., 2011; Kamaraj et al., 2012). Following a bioassay-guided examination on the barks of A. squamosa against CQ-sensitive and -resistant strains of P. falciparum, three ALKs were isolated: N-nitrosoxylopine, roemerolidine, and duguevalline. All three of these ALKs had anti-malarial properties. Antiplasmodial action was shown in vitro by isolated aporphine ALKs with IC50 values ranging from 7.8 M to 34.2 M. (Johns et al., 2011). These results provided support for the use of A. squamosa by traditional medicine practitioners as an antimalarial.

CONCLUSION

A. squamosa is a species of tropical fruit tree that has been the subject of substantial phytochemical and bioactive research. In addition to playing a significant role in the food production business, A. squamosa has been shown to be capable of a number of other bioactivities. Based on the comprehensive literature review shown earlier, anticancer, antiparasitic, and pesticidal actions are currently being regarded to be the most promising. Because the majority of the earlier research only focused on the bioactivities of various plant extracts, further research on the bioactive compounds and their exhaustive underlying mechanism is a crucial pivot for exploiting it in pharmaceutical and agricultural productions. This is because the bioactivities of different plant extracts were the primary focus of the majority of the earlier research. In addition, the ongoing clinical investigations focus on the enormous pharmacological potential of A. squamosa but ignore its impact on neurodegeneration.

**REFERENCES**

[1]. Adcock, H. Pharmageddon: Is it too late to tackle growing resistance to anti-infectives? Pharm. J. 269: 599–600, 2002.

[2]. Alali, F.Q., X.X. Liu and J.L. McLaughlin. Annonaceous acetogenins: Recent progress. J. Nat. Prod. 62: 504–540, 1999.

[3]. Andrade, E.H.A., B.Z. Maria das Graças, J.G.S. Maia, H. Fabricius and F. Marx. Chemical characterization of the fruit of Annona squamosa L. occuring in the Amazon. J. Food Compost. Anal. 14: 227–232, 2001.

[4]. Araya, H. Studies on annonaceous tetrahydrofuranic acetogenins from Annona squamosa L. seeds. Bull. Nat. Inst. Agro-Environ. Sci. (Japan) 23: 77–149, 2004.

[5]. Araya, H., M. Sahai, S. Singh, A.K. Singh, M. Yoshida, N. Hara and Y. Fujimoto. Squamocin-O-1 and squamocin-O-2, new adjacent bis-tetrahydrofuran acetogenins from the seeds of Annona squamosa. Phytochemistry 61: 999–1004, 2002.

[6]. Assefa, T. Evaluation of the larvicidal effects of Annona squamosa and tagetes minuta essential oils and crude extracts against anopheles mosquito larvae under laboratory and semi field conditions. Addis Ababa University, Addis Ababa, 2011.

[7]. Bermejo, A., B. Figadère, M.-C. Zafra-Polo, I. Barrachina, E. Estornell and D. Cortes. Acetogenins from Annonaceae: Recent progress in isolation, synthesis and mechanisms of action. Nat. Prod. Rep. 22: 269–303, 2005.

[8]. Bhakuni, D.S., S. Tewari and M.M. Dhar. Aporphine alkaloids of Annona squamosa. Phytochemistry 11: 1819–1822, 1972.

[9]. Bhaumik, P.K., B. Mukherjee, J.P. Juneau, N.S. Bhacca and R. Mukherjee. Alkaloids from leaves of Annona squamosa. Phytochemistry 18: 1584–1586, 1979.

[10]. Bonneau, N., J. Le Ven, I. Schmitz-Afonso, V. Guérineau, I.B. ba Ndob, L. Baloul, G. Lewin, O. Laprévote, A. Brunelle and D. Touboul. Annonaceous acetogenins as environmental neurotoxins: Human exposure from edible annona fruits. Planta Med. 78: PH25, 2012.

[11]. Caparros-Lefebvre, D. and A. Elbaz. Possible relation of atypical parkinsonism in the French West Indies with consumption of tropical plants: A case-control study. Lancet (London, England) 354: 281–286, 1999.

[12]. Chance, B., H. Sies and A. Boveris. Hydroperoxide metabolism in mammalian organs. Physiol. Rev. 59: 527–605, 1979.