



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## Piscicidal effect of leaf of *Anona squamosa* on Indian Major carps

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### Abstract:

*Anona Squamosa* grows wild it is also cultivated throughout India. The use of piscicidal plants to kill fishes is a common practice. The fresh aqueous solution was tried on the fish to study the effect. The behavior of fish has been discussed in this paper.

### Introduction

*Annona squamosa* L. (Annonaceae) is a fruit tree with a long history of traditional uses. *A. squamosa* is an evergreen plant mainly located in tropical and subtropical regions. Srikayas, the fruits of *A. squamosa*, are extensively used to prepare candies, ice creams and beverages. A wide range of ethno-medicinal uses has been related to different portions of *A. squamosa*, such as tonic, apophlegmatisant, cool medicine, abortient and heart sedative. Numerous research projects on *A. squamosa* have found that it has anticancer, anti-oxidant, antidiabetic, antihypertensive, hepatoprotective, antiparasitic, antimalarial, insecticidal, microbicidal and molluscicidal activities. Phytochemistry investigations on *A. squamosa* have considered annonaceous acetogenins (ACGs), diterpenes (DITs), alkaloids (ALKs) and cyclopeptides (CPs) as the main constituents.

Piscicidal plants are commonly used by the tribal people of Bihar for fish catching operations (Rooj et. al., 1984) or for eradication of the unwanted fishes from ponds mostly at the time of preparation before stocking with seed. The pond owners resort to this practice in order to eliminate to the extent possible the hazards of unwanted small fishes such as minnows which often are mixed up with natural collections of carp seed and tilapia from distant centres during dry season. During spring and summer, once in two or three years, when it is felt necessary, farmers take out whole lot of fish using piscicidal plant extracts. (Banerjee & Singh, 1933). A list of piscicidal plants is available literature is scanty. (Roy et. al., 1986, Roy and Dattamunshi 1988, and Moitra and Dattamunsi 1989). *Anona Squamosa* grows wild it is also cultivated throughout India. It is a small evergreen plant of about 20 ft. high, with globose fruits, which become yellowish green when ripe. It is interesting to know that the roots, leaves, seeds and even unripe fruits of this plant are fatal, (Chopra et. al., 1989) whereas the ripe fruit is edible, tastes sweet and has a

delicate flavour. The roots are regarded as purgative as these contain hydrocyanic acid, (Dastur 1988). Seeds, leaves and unripe fruits contain an acid principle and are used for killing vermin and lice. Pammel (1911) records the plants as fish poison.

The leaves of *Anona squamosa* were collected, and fresh aqueous extract was prepared from leaves weighed beforehand, crushed and soaked in measured quantity of distilled water for 15 hrs. The solution was then filtered using a fine cloth.

The Indian major carps (*Catla catla*, *Labeo rohita* and *Cirrihinus mrigal*) fry were collected from local fish breeding centres and acclimatized in an aquarium in laboratory conditions for five days. During these five days, the fry were fed on Zooplankton. The weight of the fry was 1400±50 mg. No food was given during the experimental period, that started after the five days of acclimatization. During the experiment, fry were exposed to various ascending series of concentration of aqueous extract. A set of 12 glass aquaria of 10 litres capacity each was treated with different concentrations keeping a control. 10 specimens were released in each aquaria. The effect of aqueous extract on the quality of water has been then investigated following the standard methods (APHA WPCF 1980). Behavioural response of the fishes under treatment were observed just after introducing the fishes in the test solution prior to mortality.

#### **Mortality levels:**

The physico-chemical parameters were studied from the water samples taken from the control aquarium and experimental aquarium. Exposure of the specimens to different concentrations for 48 hours showed the following trend. No mortality upto 50 ppm, 10% mortality at 60 ppm, 20% mortality at 80 ppm, 30% mortality at 100 ppm, 50% mortality at 120 ppm, 70% mortality at 140 ppm and 100% mortality at 160 ppm.

#### **Physico-chemical conditions:**

There was no change observed in pH of the water, dissolved oxygen had a decreasing tendency with increasing concentration of extract in experimental aquarium with fluctuations, carbon dioxide showed an increasing trend. No change in total alkalinity and temperature was recorded.

The fishes showed peculiar symptoms poisoning while in the test solutions. They showed Zig Zag and fast movements, increase in opercular movement, vigour in swimming along the side of the aquaria and tendency to escape from stressful environment. They seemed to be suffocating due to respiratory constraint. The specimens tended to become vertical near the bottom of aquarium and showed sluggish movement in later stage. They finally lost equilibrium and died.

#### **Discussion:**

**Food:** Fruits are normally eaten fresh. The pulp can be used as a flavouring in ice cream. Between 50-80% of the fruit is edible. The vitamin C content is appreciable (35-42 mg/100 g) and slightly higher than in grapefruit. The nutrient value of thiamine, potassium and dietary fibre is also significant. **Medicine:** Leaves, shoots, bark and roots have been reported to have medicinal properties. The unripe fruit is astringent, and the root is a drastic purgative, the seed of the plants is believed to have antifertility activity. The roots are used as a drastic purge. The leaves are used as a vermicide, for treating cancerous tumours and are applied to abscesses, insect bites and other skin complaints. Scrapings of root-bark are used for toothache. Powdered seeds are used to kill head-lice and fleas but care should be taken that the powder does not come in contact with the eyes as this causes great pain.

The use of piscicidal plants to kill fishes is a common practice in the tribal and remote rural areas to get maximum catch. Benerjee and Singh (1993) studied the toxicity of *Acacia auriculiformis* seed pods used by the farmers of south Bihar for complete removal of fishes from water bodies. Roy et. al. (1986) studied the effects of saponin on gills of *Anabas testudineus*. Bhatt and Dhyami (1990) studied the lethal effect of piscicidal compound of plant origin on fresh water animals.

An alkaloid is the active ingredient in the leaves of *Anona Squamosa* (Wehmer 1935, Chopra et. al., 1984) due to which the leaves have a bitter taste (The wealth of India, 1976). Saponins, alkaloids, glycosids, and steroids as active ingredients are found in more than 50% of the piscicidal plants (Mahajan 1993). There was much secretion mucus through gills and body surface in fishes in test solution. Roy et al., recorded (1986) increased mucus production in order to delimit the direct contact of toxic water. As mucus also acts as diffusion barrier these factors reduce the efficiency in exchange of gasses in the gills and finally lead to hypoxia and death. The exposure of piscicidal ingredients causes gradual accumulation of the toxic material into the body of animals. The accumulation of the toxicants in aquatic animals may take place directly through the surface absorption (Pillai et al. 1980) orally through the contaminated food (Roberts 1976). The stoppage of food during the experiments suggested that the entry of the plant toxin into the body of fish might have been mainly through the surface or gills. The alkaloid ingredients cause an irritation to the fish body which was evident from the fast and zig zag swimming; escaping attitudes were observed too.

The decrease in dissolved oxygen in water may be due to chemical factors. The movement of fishes probably become very fast due to higher consumption of dissolved oxygen and increase in carbon dioxide level in water.

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