

A STUDY ON THE INVESTIGATION OF ANNONA MURICATA FRUIT AND LEAVES FOR THE CHARACTERISATION PROPERTIES IN THE TREATMENT OF CANCER USING UV AND FTIR.

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ABSTRACT

Many active compounds and chemicals have been found in graviola, as scientists have been studying its properties since the 1940s. Most of the research on graviola focuses on a novel set of chemicals called Annonaceous acetogenins. Graviola produces these natural compounds in its leaf and stem, bark, and fruit seeds. Three separate research groups have confirmed that these chemicals have significant antitumorous properties and selective toxicity against various types of cancer cells (without harming healthy cells) publishing eight clinical studies on their findings. The investigator has made attempt to find the use of Annona Muricata fruit and leaves in the treatment of cancer treatment. The observed that from the investigation is able to prove the presence of anti cancer molecule in Annona Muricata fruit and Annona Muricata fruit leaves. The Annona Muricata fruit and Annona Muricata fruit leaves were successfully analyzed by using FTIR and UV techniques. From the FTIR technique it is found that the various types of functional groups were conformed in the Annona Muricata fruit and Annona Muricata fruit leaves. The UV absorption spectrum of Annona Muricata fruit and Annona Muricata fruit leaves identifies the $\pi-\pi^*$ and $n-\pi^*$ transition with different compound values.

INTRODUCTION:

Many of the acetogenins have demonstrated selective toxicity to tumor cells at very low dosages as little as 1 part per million. Four studies were published in 1998 which further specify the chemicals and acetogenins in graviola which are demonstrating the strongest anticancerous, antitumorous, and antiviral properties. In a 1997 clinical study, novel alkaloids found in graviola fruit exhibited antidepressive effects in animals. Graviola is a small, upright evergreen tree, 5–6 m high, with large, glossy, dark green leaves. It produces a large, heart-shaped, edible fruit that is 15–20 cm in diameter, is yellow-green in color, and has white flesh inside. Graviola is indigenous to most of the warmest tropical areas in South and North America, including the Amazon. The fruit is sold in local markets in the tropics, where it is called guanábana in Spanish-speaking countries and graviola in Brazil. The fruit pulp is excellent for making drinks and sherbets and, though slightly sour-acid, can be eaten out of hand.

SCOPE AND OBJECTIVES:

Need For The Present Study

The growing of fruits is limited in many countries to certain seasons and localities. In order to meet the demand of the market throughout the year in all areas, the commodities are preserved using different techniques. Actually, this research, is a about Annona Muricata fruits. Annona Muricata fruit does not travel well and is rarely available fresh in areas where it is not grown.

Nutritionally, the Annona Muricata fruit is high in carbohydrates, particularly fructose and also contains significant amounts of vitamin C, vitamin B₁, and vitamin B₂. Parts of the Annona Muricata tree are used in natural medicine in the tropics, including the bark, leaves, roots, fruit, and fruit seeds. The fruit and fruit leaves are taken for worms and parasites, to cool fevers, to increase mother's milk after childbirth, and as an astringent for diarrhea, dysentery and mainly it are used for cancer treatment. So this project to check the medicinal property and different chemical compound with help of UV and IR instrument.

OBJECTIVES OF THE STUDY:

- ❖ To identify the different types of compounds and functional groups present in Annona Muricata fruit and Annona Muricata fruit leaves.
- ❖ To investigate of the Annona Muricata fruit and Annona Muricata fruit leaves with instrumental investigation of UV and IR.

- ❖ To find the comparison of anti cancer property of Annona Muricata fruit and Annona Muricata fruit leaves.

MATERIALS AND METHODS:

The investigator collects different types of materials. Those to be given below. Fruits were obtained from Sivajinagar in Bangalore. The fruits were washed with running water, dried with a towel and stored at room temperature ($\sim 28^\circ\text{C}$). Healthy fruits were cut with a stainless steel knife and the pulp and seeds were separated manually. The pulp (pH 4.3) was homogenized in a domestic mixer and stored at -15°C . After the treatment to reduce the moisture and grind it, finally the powder to be obtained.

UV Instrumentation

Molecules containing π -electrons or non-bonding electrons (n-electrons) can absorb the energy in the form of ultraviolet or visible light to excite these electrons to higher anti-bonding molecular orbitals. The more easily excited the electrons (i.e. lower energy gap between the HOMO and the LUMO), the longer the wavelength of light it can absorb.

IR Instrumentation

Infrared spectroscopy exploits the fact that molecules absorb specific frequencies that are characteristic of their structure. These absorptions are resonant, i.e. the frequency of the absorbed radiation matches the transition energy of the bond or group that vibrates. The energies are determined by the shape of the molecular potential energy surfaces, the masses of the atoms, and the associated vibronic coupling.

FTIR

Fourier transform infrared (FTIR) spectroscopy is a measurement technique that allows one to record infrared spectra. Infrared light is guided through an interferometer and then through the sample (or vice versa). A moving mirror inside the apparatus alters the distribution of infrared light that passes through the interferometer. The signal directly recorded, called an "interferogram", represents light output as a function of mirror position. A data-processing technique called Fourier transform turns this raw data into the desired result (the sample's spectrum): Light output as a function of infrared wavelength (or equivalently, wavenumber). As described above, the sample's spectrum is always compared to a reference.

RESULTS AND DISCUSSION:

The Annona Muricata fruit and Annona Muricata fruit leaves samples were characterized by using UV-Visible and FTIR techniques. These are discussed below.

FTIR Spectrum Of Annona Muricata Fruit

In Annona Muricata Fruit the FTIR spectrum has lots of values are presented, here we discussed only a few important spectrum values.

Amides:

- ❖ Observed value at 3394.72 cm^{-1} .
- ❖ Primary amides present and N-H stretching mode of vibration.

Alkane:

- ❖ Observed value at 2924.09 and 2862.36 cm^{-1} .
- ❖ Alkane present and C-H stretching mode.

Alkynes:

- ❖ Observed value at 2167.99 cm^{-1} .
- ❖ Alkynes present and -C (triple bond) C- stretching mode of vibration.

Carbonyls:

- ❖ Observed value at 1728.22 and 1827.92 cm^{-1} .
- ❖ Carbonyls present and C=O stretching mode.

Aromatics:

- ❖ Observed value at 1427.32 cm^{-1} .
- ❖ Aromatics present and C-C (in ring) stretching mode of vibration.

Aliphatic amines:

- ❖ Observed value at 1056.87 cm^{-1} .
- ❖ Aliphatic amines present and C-N stretching mode.

Alkyl halides:

- ❖ Observed value at 779.24 , 594.08 and 524.64 cm^{-1} .
- ❖ Alkyl halides present and C-Cl stretching mode.

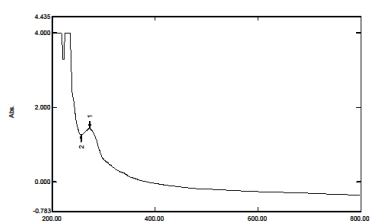
The UV absorption spectrum of Annona Muricata Fruit was recorded in the range of 200-300nm using LAMBDA-35 UV - Visible spectrometer. From the UV absorption spectra of Annona Muricata Fruit, the peak values are 272.00 and 256.00 can be found. The peak value 272 nm represents the $n-\pi^*$ transition. It indicates nitrate (NO_2) compound present in the Annona Muricata Fruit. The peak values 256 nm represents the $\pi-\pi^*$ transition. It indicates aromatic compound present in the Annona Muricata Fruit.

Spectrum Peak Pick Report

03/17/2014 04:33:38 PM

Data Set: YELLOW UV.spc - RawData

SHIMADZU



No.	UV	Wavelength	Abs.	Description
1	272.00	272.00	4.437	
2	256.00	256.00	2.203	

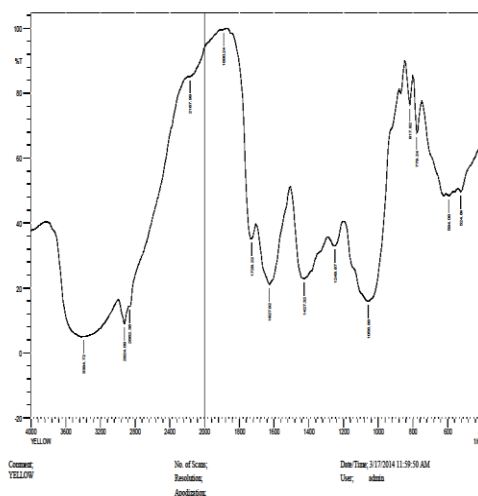
Measurement Properties
 Wavelength Range (nm): 200.00 to 800.00
 Scan Speed: Fast
 Sampling Interval: 2.0
 Auto Sampling Interval: Disabled
 Scan Mode: Single

Instrument Properties
 Instrument Type: UV-1700 Series
 Measuring Mode: Absorbance
 Cell Width: 1.0 mm
 Light Source Change Wavelength: 340.0 nm
 Cell Change: Normal

Attachment Properties
 Attachment: None

Sample Preparation Properties
 Weight:
 Volume:
 Dilution:
 Path Length:
 Additional Information:

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SUMMARY AND CONCLUSION:

The investigator has made attempt to find the use of Annona Muricata fruit and leaves in the treatment of cancer treatment. The observed that from the investigation is able to prove the presence of anti cancer molecule in Annona Muricata fruit and Annona Muricata fruit leaves. The Annona Muricata fruit and Annona Muricata fruit leaves were successfully analyzed by using FTIR and UV techniques. From the FTIR technique it is found that the various types of functional groups were conformed in the Annona Muricata fruit and Annona Muricata fruit leaves. The UV absorption spectrum of Annona Muricata fruit and Annona Muricata fruit leaves identifies the $\pi-\pi^*$ and $n-\pi^*$ transition with different compound values.

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