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BIOCHEMICAL ANALYSIS OF TWO MEDICINAL PLANTS - *ANNONA SQUAMOSA L.* and *GARCINIA GUMMI-GUTTA (L.)* Roxb.

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ABSTRACT

Plants are one of the most important sources of natural medicine and number of modern drugs has been isolated from them. The present investigation on the two medicinal plants *Annona squamosa L.* and *Garcinia gummi-gutta (L.)* Roxb. has revealed the presence of various biochemical compounds such as chlorophyll, protein and carbohydrate. Among the two medicinal plants taken for study, the chlorophyll 'a', chlorophyll 'b', total chlorophyll and protein content was found to be significantly higher in *Annona squamosa L.* The carbohydrate content was found to be higher in *Garcinia gummi-gutta (L.)* Roxb.

INTRODUCTION

Medicinal plants have been extensively used for treatments of many diseases. Various parts of plants such as leaves, fruits, barks, roots and even the seeds are being used for preparation of medicine. Plants are one of the most important sources of natural medicine and number of modern drugs has been isolated from them. Over 80% of world population relies on the traditional form of medicine for their basic health care. Use of medicinal herbs has become an important part of daily life despite the progress in modern medical and pharmaceutical research. Epidemiological studies on medicinal plants support that the constituents such as phenols, flavonoids, alkaloids, tannins etc. are capable of exerting protective effect against oxidative stress (Rajkumar *et al.*, 2015). *Annona*, requires a tropical or subtropical climate with summer temperatures from 25 °C to 41 °C, and mean winter temperature above 15 °C. It is sensitive to cold and frost, being defoliated below 10 °C and killed by temperatures of a couple of degrees below freezing. It is only moderately drought tolerant, requiring at least 700 mm of annual rainfall and will not produce fruit well during droughts.

It will grow from sea level to 2,000 meters and does well in hot dry climates, differing in its tolerance of lowland tropics from many of the other fruit bearers in the *Annona* family. In traditional Indian, Thai and American medicine, the leaves are used in a decoction to treat dysentery and urinary tract infection. In traditional Indian medicine, they are also crushed and applied to wounds. It is considered beneficial for cardiac disease, diabetes, hyperthyroidism and cancer. The root is considered as a drastic purgative. The crushed leaves are sniffed to overcome hysteria and fainting spells, they are also applied on ulcer and wounds. A leaf decoction was taken in the case of dysentery (Gajalakshmi *et al.*, 2011). Leaves are used as poultice over boils and ulcers and also to kill lice. Bruised leaves with salt make a cataplasm to induce suppuration. *Garcinia gummi-gutta (L.)* Roxb. is one of the most diverse species among Guttiferae family. It is an evergreen, small or medium-sized dioecious, understory tree, 5 –20 m tall, about 70 cm dbh, with a rounded crown and horizontal or drooping branches. Seed-grown plants start bearing fruit after 10-12 years, whereas, grafts bear fruit from the third year onwards and will attain the stage of full bearing at the age of 12-15 years. In India, flowering occurs in January-March and fruits mature in July.

Table 1. Chlorophyll 'a', chlorophyll 'b' and Total chlorophyll contents of the two medicinal plants

Name of the plant	Chlorophyll 'a' of leaf sample (mg/g)	Chlorophyll 'b' of leaf sample (mg/g)	Total chlorophyll of leaf sample (mg/g)
<i>Annona squamosa</i> L.	7.83 ± 0.71	13.29 ± 0.57	11.88 ± 0.50
<i>Garcinia gummi-gutta</i> (L.) Roxb.	6.99 ± 0.75	12.84 ± 0.35	11.47 ± 0.31

Values are mean ± SD of triplicates

Table 2. Protein content of *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb. at different concentrations

Concentration (in ml)	<i>Annona squamosa</i> L. (mg/g f.wt.)	<i>Garcinia gummi-gutta</i> (L.) Roxb. (mg/g f.wt.)
0.2ml	46.64±1.88	44.84±0.53
0.4ml	48.79±1.39	47.57±1.39
0.6ml	50.30±1.38	48.79±1.39
0.8ml	52.11±1.05	50.91±2.40
SEd	1.8360	1.3606
CD (p<0.05)	4.0909	3.0316

Values are mean ± SD of triplicates

Table 3. Carbohydrate content of *Annona squamosa* L. at different concentrations

Concentration (in ml)	<i>Annona squamosa</i> L. (mg/g f.wt.)	<i>Garcinia gummi-gutta</i> (L.) Roxb. (mg/g f.wt.)
0.2ml	60.94±4.43	63.50±1.10
0.4ml	71.16±2.19	69.86±1.72
0.6ml	73.00±1.51	70.80±4.14
0.8ml	72.04±2.22	77.73±3.29
SEd	2.3122	2.3921
CD (p<0.05)	5.1518	5.3299

Values are mean ± SD of triplicates

The fruits of the plant are commercially important for its valuable chemical components. Mostly these species are found in forest. Most of plants are less cultivated in homes and extensively endemic to Western Ghats. *Garcinia gummi-gutta* is commonly known as kudampuli or malabar tamarind belonging to the family Clusiaceae. These families are a rich source of secondary metabolites. The orange yellow mature fruits either drop from the tree or are harvested manually. Alkaloids, phenolic compounds, carbohydrates, steroids, proteins, terpenoids, tannins constitute the phytoconstituents of *Garcinia gummi-gutta*.

MATERIALS AND METHODS

The leaves of *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb. were collected from the local area of Calicut district in Kerala during the month of November. The taxonomic identification of plant material was done at Botanical Survey of India, Coimbatore. The fresh leaves were taken for chlorophyll, protein and carbohydrate studies.

Estimation of biochemical parameters

Chlorophyll 'a', 'b' and total chlorophyll were analyzed following the method of Arnon (1949). Protein was estimated following the method of Lowry *et al.*, 1951. Carbohydrate was estimated using the method of Hedge and Hofreiter (1962).

Statistical analysis

The data obtained from various biochemical observations were subjected to statistical analysis as per the procedure of Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Annona squamosa L. belonging to the family Annonaceae, commonly known as custard apple is a native of West Indies. *Annona squamosa* is a tree with edible fruits that show

medicinal value. *Garcinia gummi-gutta* (L.) Roxb. is one of the most diverse species in the Clusiaceae family. It is an evergreen, small or medium-sized dioecious tree, 5–20 m tall. The biochemical studies of the two medicinal plants *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb. carried out showed the following results.

Biochemical analysis of the leaves of *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb.

The biochemical parameters such as chlorophyll, protein and carbohydrate were analyzed using fresh leaf samples.

Estimation of Chlorophyll 'a', Chlorophyll 'b' and Total chlorophyll content

Chlorophyll 'a', chlorophyll 'b' and total chlorophyll content was estimated for the two medicinal plants. The chlorophyll 'a' content of *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb. was estimated to be 7.83 ± 0.71mg and 6.99 ± 0.75 mg respectively (Table-1). The chlorophyll 'b' content of *Annona squamosa* L. and *Garcinia gummi-gutta* (L.) Roxb. was found to be 13.29 ± 0.57mg and 12.84 ± 0.35 mg. The total chlorophyll present in the medicinal plants was estimated to be 11.88 ± 0.50mg (*Annona squamosa*) and 11.47 ± 0.31mg (*Garcinia gummi-gutta*). Studies on the biochemical parameters of *Chromolaena odorata* (L.) R.M. King H. Rob. and *Adhatoda vasica* Nees have revealed a significantly higher Chlorophyll 'a', 'b' and total chlorophyll content in *Chromolaena odorata* (Gayathri and Bindhu, 2016).

Estimation of protein

Protein was estimated at different concentrations viz, 0.2, 0.4, 0.6 and 0.8 ml for both the medicinal plants *Annona squamosa* and *Garcinia gummi-gutta*. It was found to be significantly higher at 0.8 ml concentration in both *A. squamosa* and *G. gummi-gutta*. The values are presented in Table 2. At 0.2 ml concentration, the protein content was 46.64±1.88 mg (*A.*

squamosa) and 44.84±0.53 mg (*G. gummi-gutta*). It increased to 52.11±1.05 mg (*A. squamosa*) and 50.91±2.40 mg (*G. gummi-gutta*) at 0.8 ml concentration. The biochemical parameters studied in four medicinal plants namely *Rhodomyrtus tomentosa*, *Psidium guajava*, *Citrus aurantium* and *Citrus limonum* showed a significantly higher protein, carbohydrate and chlorophyll 'a' content in *C. aurantium*. The chlorophyll 'b' and total chlorophyll content was found to be significantly higher in *R. tomentosa* (Kiruba, 2014).

Estimation of carbohydrate

The carbohydrate content was estimated at different concentrations for both the medicinal plants *Annona squamosa* and *Garcinia gummi-gutta*. At 0.2 ml concentration, the carbohydrate was found to be 60.94±4.43 mg and 63.50±1.10 mg in *A. squamosa* and *G. gummi-gutta* respectively (Table 3). The carbohydrate level increased with increase in the concentration. Carbohydrate are the primary source of energy to our body and are often referred to as "fuel of life". Earlier studies have shown higher carbohydrate content in *Chromolaena odorata* at 0.1 ml concentration itself (Gayathri and Bindhu, 2016). Watal *et al.* (2014) have evaluated the presence of carbohydrate, glycosides and coumarins in the plant parts that are known to exert a beneficial action on immune system by increasing the strength of the body and hence can be used as a valuable dietary supplement.

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