

Phytochemical Studies on Fruits of *Garcinia gummi-gutta* (L.) Roxb.

Soumya L^{*1} and V. Manimekalai²

¹⁻² P.G. and Research Department of Botany, Sri Parasakthi College for Women, (Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli - 627 012), Courtallam - 627 802, Tamil Nadu, India

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Garcinia gummi-gutta (L.) Roxb. is an economically important fruit crop in Kerala. *Garcinia* plants contain broad range of biologically active metabolites which in the last few decades has received considerable attention due to the chemical compositions of their extracts with compounds which have been shown to have beneficial effects in several diseases [1]. The bioactive molecules like hydroxycitric acid (HCA), flavanoids, terpenes, polysaccharides, procyanidines and polyisoprenylated benzophenone derivatives like garcinol, xanthochymol and guttiferone isoforms have been isolated from the genus *Garcinia*. The HCA has been known for its hypolipidemic property. The plant *Garcinia gummi-Gutta* (L.) Roxb. belongs to the family Clusiaceae. It is a wild tropical and subtropical plant. The fruits are popularly known as Malabar tamarind or Kudampuli whose dried pericarp is used as a condiment and is used as an alternative tamarind to impart a special flavour and taste to curries in Kerala [8]. The fruits are commercially important as a rich source of the much-valued anti-obesity phytochemical hydroxycitric acid and several industrial units are located in central Kerala for extracting the value-added product from the fruits [3]. *Garcinia gummi-Gutta* extract standardized for 20% garcinol reduces adipogenesis and high fat. Garcinol, a polyisoprenylated benzophenone extracted from the fruit rind of *Garcinia indica*, is known for its antioxidant, anti-inflammatory and anticancer activities.

Fresh fruit material of *Garcinia gummi-Gutta* was washed with distilled water, air dried and made to fine powder using a sterile electrical blender. The fine powder was stored in airtight bottles at room temperature. Using solvents, distilled water and ethanol 50gm of the sample were collected. Two extracts were prepared from each of the solvents. The extracts were filtered through Whatman's No.1 filter paper. Qualitative tests were conducted on both the filtered and crude extracts. Fluorescent characteristic features of fruit of *Garcinia gummi-Gutta* in various extracts were conducted under UV light at 360nm [12].

In GC-MS analysis of four samples sized 1cm, 2cm, 3cm and 4cm, the Clarus 680 GC was used in the analysis employed a fused silica column, packed with Elite-5MS (5% biphenyl) and the components were separated using Helium as carrier gas at a constant flow of 1 ml/min. The injector temperature 1 µL of extract sample injected into the instrument the oven temperature was as follows: 60 °C (2 min); following it was held for 6 min. The mass detector conditions were: transfer line temperature 240

°C; ion source temperature scan time 0.2 sec and scan interval of 0.1 sec. The fragments from 40 to 600 Da. The spectrums of the components stored in the GC-MS NIST (2008) library.

For GC-MS studies, four different sized *Garcinia* fruits are selected (1cm, 2cm, 3cm and 4cm) and among them sample 1 having size 1cm and sample 4 having size 4cm show that, they two are rich in the compound named CYCLOHEXANOL, 1-[3-(1-PYRROLIDINYL)-1-PROPENYL]. Two samples sized 3 cm and 4 cm shows difference in the presence of compound, for instance, the sample sized 3cm shows abundance of compound named PIPERIDINE-2, on the other hand sample sized 4 cm is abundant with the compound 3(2H)-ISOXAZOLONE, 4,5-DIMETHYL. The phytochemical analysis of *Garcinia Gummi-Gutta* reveals the presence of several bioactive molecules such as xanthenes, benzophenones and organic acids [4], [15]. The fruit contain 10% to 30% hydroxycitric acid (HCA), [5] a well-known hypolipidemic agent and an important constituent of food supplement for weight management [13-14].

Xanthenes

Xanthenes are hetero cyclic compounds having a dibenzo-r-pyrone skeleton as the basic structure. Xanthenes are a class of phenolic compounds showing antioxidant properties and potential medicinal benefits [9-10]. The ripe mangosteen pericarp is widely used as a component in many healthy foods, cosmetics and medicines. Xanthenes have been abundantly reported in the angiosperm families, namely Gentianaceae, Clusiaceae, Moraceae and Polygonaceae. More than 70 xanthenes have been reported from *Garcinia* species especially from the mangosteen fruit [11].

Benzophenones

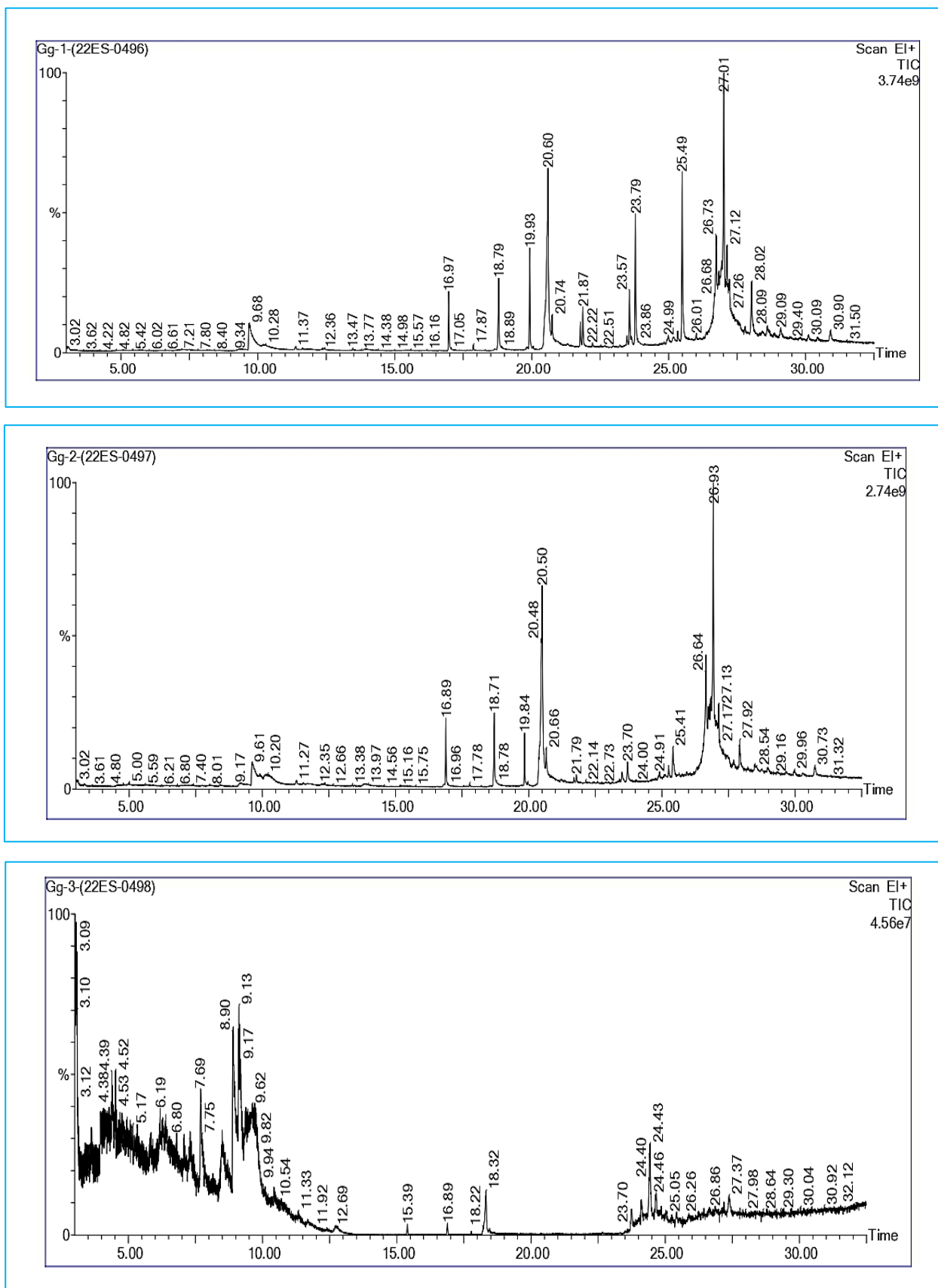
Benzophenones are a class of compounds that have a common phenol-carbonyl-phenol skeleton and exhibit significant structural diversity. Plant species belonging to the family Clusiaceae are characterized by the presence of benzophenones [2]. Various polyisoprenylated benzophenones have been reported from *G. mangostana*, *G. indica*, and *G. gummi-gutta*. Benzophenone is used as an ultraviolet curing agent, flavour ingredient, fragrance enhancer and perfume fixative, and as an additive for plastics, coatings and adhesive formulations. Benzophenone is also used as a screen to prevent ultraviolet light-induced damage to cosmetics.

*Correspondence to: Soumya L, E-mail: soumyalv85@gmail.com; Tel: +91 8592968882

Organic acids

Organic acids are synthesized in plants as a result of the incomplete oxidation of photosynthetic products and represent the stored pools of carbon accumulated due to different transient times of conversion of compounds in metabolic

pathways [6] Citric acid is considered as a valuable organic acid and widely used in the food, pharmaceutical, and cosmetic industries. It is well-accepted as a safe food additive as evaluated by the Food and Agriculture Organization (FAO) / WHO expert committee.



Among the four samples analyzed, sample 1 had highest cyclohexanol content (27.01%), followed by sample 2 (26.93%) and sample 4 (25.74%), however in sample 3 the

amount was (9.13%). As the fruit matures the percentage of cyclohexanol decreases as earlier reported by the graph in GC-MS analysis. Similar compounds were extracted from the same

family as we can see two novel cyclohexanone-monocyclic polyprenylated acylphloroglucinol (C-MPAP) derivatives,

named norgarmultinones A (1) and B (2), were isolated from the fruits of *Garcinia multiflora*.

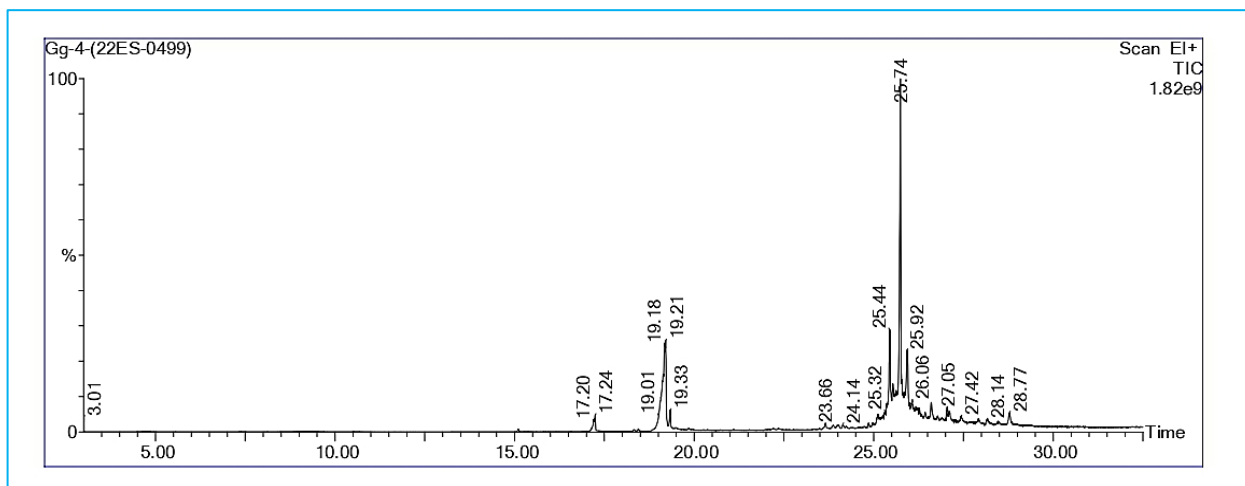


Fig 1-4 GC-MS Analysis graph

CONCLUSION

The active constituent in this tree is called Hydroxycitric acid or HCA and is gaining a reputation for assisting weight loss through appetite suppression and by reducing the body's ability to form adipose tissue during times of overeating. Various sized fruits were analyzed in the GC-MS analysis, the major component is cyclohexanol is used as solvents in a variety of

pesticide products, including outdoor yard, garden and turf products and agriculture crop products. In addition, secondary metabolites such as xanthenes, benzophenones, organic and amino acids were also reported from this plant. The potential beneficial effects include antioxidant, antihelmenthic, antidiabetic, antimicrobial, anti-obesity and hyperlipidaemic properties. Reports on the toxicity and observations during clinical trials suggest that *Garciniagummi-gutta* is safe for human consumption.

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