



## AN OVERVIEW ON *Cicca acida* (*Phyllanthus acidus*)

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### Abstract

An attempt was made to explore the ethnobotanical, economical and biological importance of *Cicca acida* or *Phyllanthus acidus*. The plant is used for 28 types of remedies like cathartic, emetic, coughs, hypertension, asthma, skin diseases etc and as a food in the raw form. In India, it is found in different states including Maharashtra, Assam, Manipur, Tamilnadu and South Indian states as home garden ornaments. The paper reviews the data related to scientific works carried out with the plant and listed the bioactive compounds isolated from the plant till date. Based on the review made, present paper highlights the need of future research with *Cicca acida* or *Phyllanthus acidus* so that more active principle for treating new ailments can be isolated and made available from the plant.

**Key words:** *Cicca acida*, Ethno medicinal, Hypertension, Ornament.

### Introduction

Terrestrial plants especially higher plants have a long history of use in the treatment of human diseases. Several well-known species, including *Papaver somniferum*, *Glycyrrhiza glabra* myrrh (*Commiphora* species), were referred to by the first known written record on clay tablets from Mesopotamia in 2600 BC and these plants are still in use today for the treatment of various diseases as ingredients of official drugs or herbal preparations used in system of traditional medicine (Newman et al., 2000). This study highlights the use of terrestrial medicinal plant in the traditional medical practices of the people especially those used in treatment of cathartic, emetic, coughs, hypertension, asthma and skin diseases etc.

The Otacheite gooseberry, *Phyllanthus acidus* Skeels (syns. *P. distichus* Muell. Arg.; *Cicca acida* Merr.; *C. disticha* L.), also called Malay gooseberry, Tahitian gooseberry, Country gooseberry, Star gooseberry, West India gooseberry, simply gooseberry tree, is one of the trees with edible small yellow berries fruits in the *Phyllanthaceae* family. Despite its name, the plant does not resemble the gooseberry except for the acidity of its fruits. This is a curious and

ornamental shrub or tree, 6 1/2 to 30 ft (2-9 m) high, with spreading, dense, bushy crown of thickish, rough, main branches, in general aspect resembling the Bilimbi. At the branch tips are clusters of deciduous, greenish or pinkish branchlets 6 to 12 in (15-30 cm) long, bearing alternate, short-petioled, ovate or ovate-lanceolate, pointed leaves 3/4 to 3 in (2-7.5 cm) long, thin, green and smooth on the upper surface, blue-green with a bloom on the underside; altogether giving the impression of pinnate leaves with numerous leaflets. There are 2 tiny, pointed stipules at the base of each leaf. Small, male, female and some hermaphrodite, 4-parted, rosy flowers, are borne together in little clusters arranged in panicles 2 to 5 in (5-12.5 cm) long, hanging directly from leafless lengths of the main branches and the upper trunk, and the fruits develop so densely that they form spectacular masses. The fruit is oblate with 6 to 8 ribs, 3/8 to 1 in (1-2.5 cm) wide, pale-yellow to nearly white when fully ripe, waxy, fleshy, crisp, juicy and highly acidic. Tightly embedded in the center is a hard, ribbed stone containing 4 to 6 seeds (Morton et al., 1987).

### The Botanical Classification of the Plant

Kingdom...Plantae  
Division.....Mgnoliophyta  
Class.....Mgnoliopsida  
Order.....Mglgiphiales  
Family.....Phyllanthaceae  
Tribe.....Phyllanthaceae  
Subtribe.....Flueggeinae  
Genus.....Phyllanthus  
Species.....*Phyllanthus acidus*.

Other scientific names are

*Cicca disticha* Linn.  
*Cicca acida* Linn  
*Averrhoa acida* Linn.  
*Cicca acidissima* Blanco  
*Phyllanthus distichus* Muell.-Arg.  
*Phyllanthus acidissimus* Muell.-Arg.  
*Phyllanthus acidus* Skeels

This species is believed to have originated in Madagascar and to have been carried to the East Indies. Quisumbing (Morton et al., 1987) says that it was introduced, into the Philippines in prehistoric times and is cultivated throughout those islands but not extensively. It is more commonly grown in Indonesia, South Vietnam and Laos, and frequently in northern Malaya, and in India in home gardens. The tree is a familiar one in villages and on farms in Guam, where the fruit is favored by children, and occurs in Hawaii and some other Pacific Islands. It was introduced into Jamaica from Timor in 1793 and has been casually spread throughout the Caribbean islands and to the Bahamas and Bermuda. It has long been naturalized in southern Mexico and the lowlands of Central America and is occasionally grown in Colombia, Venezuela, Surinam, Peru and Brazil. Formerly an escape from cultivation in South Florida, there are now only scattered specimens remaining here as curiosities. The tree prefers hot, humid tropical low land up to 1000m altitude (Morton et al., 1987).

### Ethnomedicinal Utility of *Cicca acida* (*Phyllanthus acidus*)

Exhaustive literature survey showed that the plant is a good remedy for different types of ailments like emetic and purgative (Lemmens et al., 1999),

hypertension and respiratory (Sausa et al., 2007), hepatoprotective (Lee et al., 2006), psoriasis (Burkill et al., 2002), anti-diabetics. (Banik et al., 2010), antinociceptive (Catapan et al., 2000). poisoning (Caius et al., 2003), coughs (Caius et al., 2003), asthma and bronchitis (Caius et al., 2003), poulticing and soles (Caius et al., 2003), cathartic (Caius et al., 2003), rehabilitation (Vongvanich et al., 2000), addiction (Mahidol et al., 2002), liver tonic (Prasad D, 1986), laxative (Prasad D, 1986), urticaria (Prasad D, 1986), eruptions & bronchial catarrh (Prasad D, 1986). sciatica (Morton et al., 1987), lumbago or rheumatism (Morton et al., 1987), sudorific & gonorrhoea, skin disorders (Morton et al., 1987).

### Biological Utility of *Cicca acida* (*Phyllanthus acidus*)

The plant is considered as an ornamental plant. In Malaya, the ripe or unripe fruits of *Cicca acida* is cooked and served as a relish or made into a thick syrup or sweet preserve. It is also combined with other fruits in making chutney and jam because, it helps these products to "set". Often, the fruits are candied, or pickled in salt. In the Philippines, they are used to make vinegar. In Indonesia, the tart flesh is added to many dishes as a flavoring agent. The juice is used in cold drinks in the Philippines (Morton et al., 1987). Young leaves are cooked as a vegetable in Indonesia, Thailand and India (Prasad D, 1986). The root bark is used in India as tanning agent. (Rizk, 1987). The tree is used as fuel wood. The wood is fairly hard, strong, tough and durable if seasoned. The seasoned wood is used for making utensils and other small objects. (Mackeen et al., 1997), (Rizk, 1987). The energy value of the edible portion of *Cicca acida* (per 100gm) (Table -1) (Morton et al., 1987).



Fig:1(A) *Cicca acida* fruits



Fig:1(B) *Cicca acida* twig with leaves & fruits.

Moisture	91.9 g
Protein	0.155 g
Fat	0.52 g
Fiber	0.8 g
Ash	0.51 g
Calcium	5.4 mg
Phosphorus	17.9 mg
Iron	3.25 mg
Carotene	0.019 mg
Thiamine	0.025 mg
Riboflavin	0.013 mg
Niacin	0.292 mg
Ascorbic Acid	4.6 mg

Table-1. Food Value Per 100 g of Edible Portion.

### The Scientific Work carried with *Cicca acida* (*Phyllanthus acidus*)

1. Methanolic extracts of 79 Malaysian plants were assessed for antinematodal activity against *Bursaphelenchus xylophilus*. *Cicca acida* showed strong antinematodal activity. (Muhammad et al., 1997).
2. Removal of Brill Red 5B from an aqueous solution using *Cicca acida* biomass. (Karthik et al., 2009).
3. Effect of Auxin and Cytokinin on Phyllanthusol A Production by Callus Cultures of *Phyllanthus acidus* Skeels. (Duangporn et al., 2009)

4. Rat fed with the extracts from *P. acidus* showed a hepatoprotective effect against acute liver damage induced by carbon tetrachloride. (Lee et al., 2006).
5. Methanolic extracts of *P. acidus* possess strong antibacterial activity *in vitro*. (Melendez et al., 2006).
6. An extract from the medicinal plant *Phyllanthus acidus* and its isolated compounds induce airway chloride secretion: A potential treatment for cystic fibrosis (Sousa et al., 2007).
7. Selective Antimicrobial properties of *Phyllanthus acidus* leaf extract against *Candida albicans*, *Escherichia coli* and *Staphylococcus aureus* using Stokes Disc diffusion, Well diffusion, Streak plate and a dilution method (Jagessar et al., 2008).
8. Antibacterial properties of tropical plants from Puerto Rico: In the study, *Phyllanthus acidus* or *Cicca acida* was one of the plants that showed the highest antibacterial activity against *E-coli* and *Staphylococcus aureus* (Melendez et al., 2006).

### Compounds Isolated from *Cicca acida* (*Phyllanthus acidus*)

(1) Phyllanthusols A and B, Aglycon. Saccharide has been isolated from the MeOH extract of the roots of *Cicca acida*.

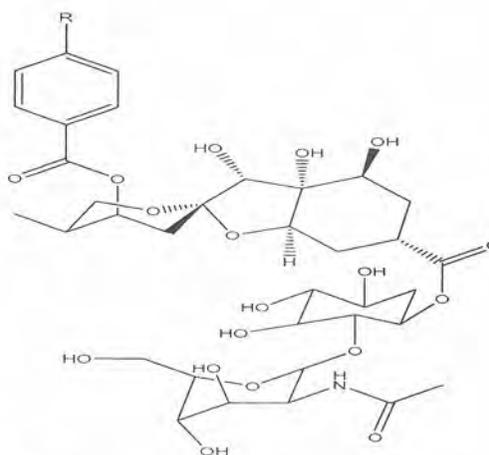


Fig: 2.- 1. Phyllanthusol A, R = OH.  
2. Phyllanthusol B, R = H.

Phyllanthusol A and B has been isolated from *Cicca acida* (*Phyllanthus acidus*), has been proposed as possible antitumor agent (Mahidol et al., 2002). Phyllanthusol A and B has attracted considerable attention as it exhibits cytotoxicity against BC and KB cell lines in vitro.

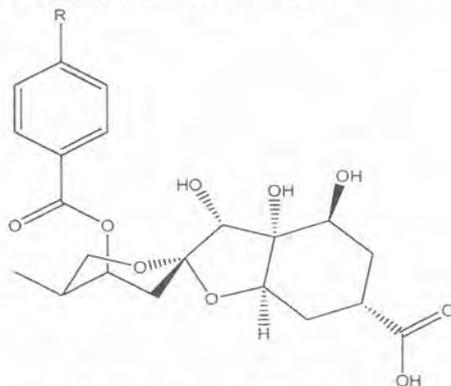


Fig. 3:-The norbisabolane aglycon  
The norbisabolane skeleton is rare in nature

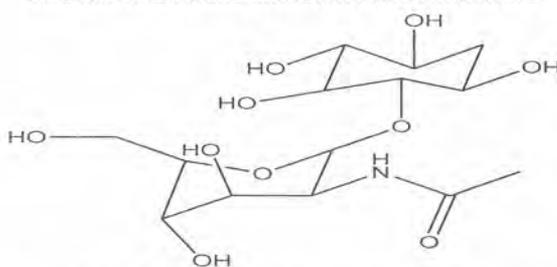


Fig. 4: - The Saccharide Structure  
The norbisabolane aglycon and the Saccharide showed no cytotoxicity

#### Future Research Needs with *Cicca acida* (*Phyllanthus acidus*)

Some research work like antinociceptive, hypertension and respiratory ailments, antibacterial, hepatoprotective, antinematodal, cystic fibrosis, antimicrobial activity of leaves and anticancer

activity have been carried out with *Cicca acida*. The triterpenoids Phyllanthusols A and B,  $\beta$ -amyryn and Cytotoxic Norbisabolane glycosides have been isolated from *Cicca acida*. In traditional medicine, it is used in the treatment of different types of ailments but very few biological activities have been undertaken to prove the traditional claims. So, as far as isolation of bioactive principles is concerned, only four compounds have so far been isolated from the plant. Keeping the traditional potentials of the plant in mind following researches may be undertaken with *Cicca acida* (*Phyllanthus acidus*).

1. Hepatoprotectivity and Neurotoxicity of the stem bark of the plant and isolation of active compounds from the plants.
2. The plant may be evaluated for its use in asthma and bronchitis, poulticing & soles and skin disorders.
3. Extractives from the plant may be evaluated for its use in cathartic activity.
4. Antinociceptive and anti-diabetic activities of the plant by phytochemical and biological screening methods.
5. Laxative and urticaria activities of the plant and its related compounds may be studied.
6. Sciatica and lumbago or rheumatism activities of the plant and its related compounds on the animals.
7. Sudorific & gonorrhoea, eruptions & bronchial catarrh properties of the plant by observing chemical and biological entities of the plant.
8. Antimicrobial activities of the stem bark of the plant by phytochemical and biological Screening methods.

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