



A short review on pharmacological properties of *Phyllanthus acidus* (L.) Skeels

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Abstract

Phyllanthus acidus is a fruiting plant belonging to the Euphorbiaceae family. It is very well known for its pharmacological products or properties. The plant species is highly rich in the content of pharmaceutical products and has the activity of antioxidant, anti-diarrheal, lipid-lowering, antiasthmatic, hepatoprotective, anticancer, antibacterial, etc. Apart from this, some of the compounds like tartaric acid, tannin, saponin, ascorbic acid, gallic acid, phytosterols, etc. are have been reported. Most of the time the plant is used for the treatment of digestive, respiratory, and skin diseases by Ayurvedic way. The chief goal of this review is to collect the information and make a compressive report on the pharmacological activity of *Phyllanthus acidus*, which may further provide the required information to carry out the future scientific study.

Keywords: *Phyllanthus acidus*, pharmacological products

Introduction

Plants are the key components for maintaining civilization. Plants are used from the historic era by human society for a different purpose. Plants have been used from traditional as well as scientific research points of view. Nowadays, plants are playing a very crucial role in the field of health care. About 80% of the health care product in the form of medicine, beauty products are obtained. A great number of plants belonging to the Euphorbiaceae family have been studied all over the world and reported as an important source of drugs [1]. Many plant species of the same family have been studied for their therapeutic activity. One of the important plants of this family i.e., *Phyllanthus acidus*, is well known for its traditional and pharmacological properties.

This plant is found all over Asia and most of the time it is migrated to other countries of the world due to its pharmaceutical properties.

The plant is used for different purposes such as; the bark, commonly used for the treatment of bronchial catarrh, and latex is well known for its laxative and emetic properties. The root of the plants is used for asthma relief and psoriasis of the feet.

Leaves are used for hive treatment and have antiscorbutic, slimming, antiasthmatic, antitumor, and antitussive properties. Antioxidant and laxative properties were found in the fruit of the plant have a hepatoprotective effect on the liver.

A wide range of bioactive compounds with hypoglycemic, hepatoprotective, antioxidant, antibacterial, anticancer, properties, etc has been reported from this plant.

Systematic status of the plant [2]

Kingdom: Plantae

Division: Spermatophyta

Subdivision: Angiosperma

Class: Dicotyledonae

Order: Euphorbiales

Family: Euphorbiaceae

Genus: *Phyllanthus*

Species: *acidus*

Morphology of the plant

The *Phyllanthus acidus* tree can reach a height of 15 m and play an intermediary between a shrub and tree. It bears a bushy crown is composed of thickish, hard branches and long twigs, at the end of which are clusters of deciduous. Branches with alternate leaves, tightly wrapped around the branch, distal, stipulate, coriaceous, acute to acuminate at the apex, rounded or broadly wedge-shaped at the base, with lanceolate stipules 3-8 mm long and 1-3.5 mm wide. Flowers are hermaphrodites (bears male and female). Found in clusters, small and pinkish, 5-to-12.5-cm long, found at the leafless section of the main branch towards the upper part. Fruits are edible, pale yellowish-green color and oblate, towards maturity pale yellow or white, waxy, crisp and juicy, and very sour with 6 to 8 lobes, and seen in densely clustered. At the center, one stone type of seed is found consisting of 4 to 6 seeds [3,4].

Pharmacological properties

Antioxidant Properties

The oxidation process can be inhibited by antioxidant substances. Producing reactive oxygen or free radicals like; peroxides and hydroxyls by oxidation can damage cells [2]. *P. acidus* has been observed with a high rate of antioxidant activity by its fruits and leaves extracts, which is crucially recommended for cardiovascular disorder [5]. Fruit extract like methanol, petroleum ether, ethyl acetate, and chloroform was recorded with antioxidant activity [6, 7]. Ethanolic and water extract of fruit have been evaluated by DPPH (2, 2-diphenyl-1-picrylhydrazyl) radical scavenging assay and aqueous extract observed with higher antioxidant activity than ethanolic extract [2]. Remarkable antioxidant rates with IC50 values of 5.96 µg/mL and 6.79 µg/mL have been recorded from pulp and seed extracts respectively. Total phenol content in the pulp of the seed and fruit was evaluated and higher content was observed in fruit than in the seed pulp. At the same time, flavonoid content was found to be higher in plant pulp extract as compared to seed

extract [8]. Some higher bioactive compounds such as terpenoids and glycosides are reported from the fruit, leaves,

bark, and root of the *P. acidus* [9].

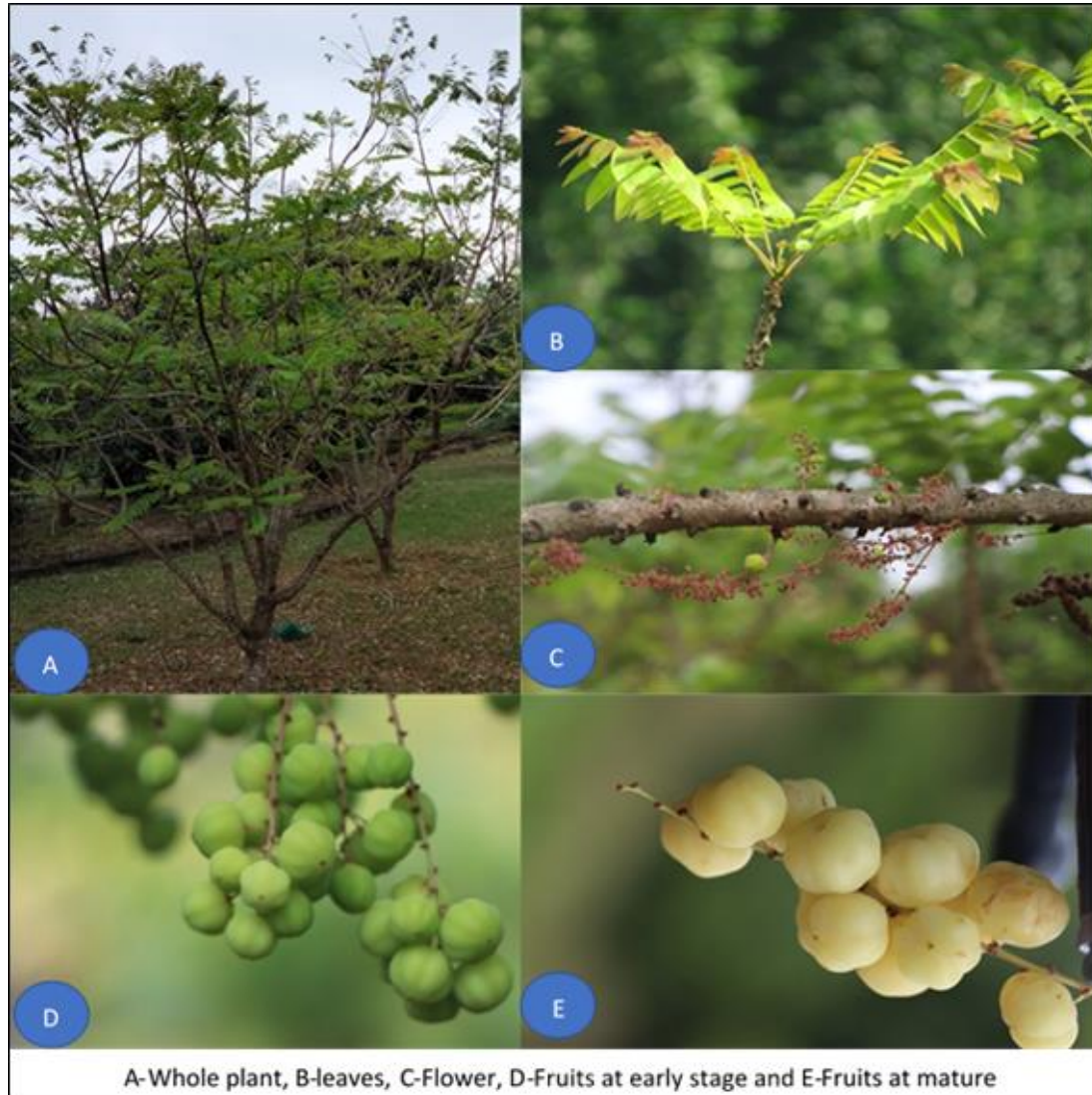


Fig 1

Antimicrobial Properties

Leaf extract of *P. acidus* was tested for its antimicrobial activity by methanolic extract against three test organisms (*Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*) and found with positive activity [10]. Fruit extracts were recorded with inhibitory properties for *Bacillus cereus* by methanolic extract and meanwhile, seed extracts were found as wide spectrum antimicrobial agents showing activity against *E. coli*, *Pseudomonas aeruginosa*, *S. typhi*, *S. aureus*, *Shigella dysenteriae*, *B. cereus*, and *Vibrio cholera* [8]. Apart from this, plant extracts were also found to be effective for bacteria; *Bacillus megaterium* [11].

Alzheimer's disease

One type of neurodegenerative disorder, mainly the loss of memory and cognition. It damaged the cerebral cortex and gradually decreases cholinergic transmission. *P. acidus* was studied for choline esterase activity by methanolic fruit extract and found a remarkable inhibition of AChE (acetylcholinesterase) and BChE (butyrylcholinesterase) with an increase in the concentration of extract. Further, it has been observed that leaves methanolic extract have the capacity for notable antioxidant activity [12, 13].

Hypoglycemic activity

A study of *P. acidus* leaves (ethanolic extract) exhibited notable activity in reducing the level of blood sugar. A series of doses like; 250, 500, and 1000 mg/kg, were tested and the most effective dose was found to be 500 mg/kg compared to standard [14].

Analgesic and Anti-inflammatory effect

Anti-inflammatory and analgesic effect have been studied on mice (Swiss albino mice) by ethanolic extract of *P. acidus* leaves. Extracts were tested in the form of doses and suitable activity for analgesic and anti-inflammatory effect recorded at 200 mg/kg body weight [15].

6. Central nervous system (CNS) Depressant activity and Antipyretic effect

P. acidus leaves through ethanolic extracts were responsible to cause CNS depression. There are many phytochemical compounds like; flavonoids and neuroactive steroids that act as ligands for gamma-aminobutyric acid (GABA), a receptor in the nervous system, gradually converted to the hypothesis and might act as benzodiazepine-like molecules. So, it is assumed that plant extracts of *P. acidus* may

increase GABAergic inhibition activity in the CNS. Antipyretic effects against pyrexia have been reported from ethanolic leaves extract. Pyrexia occurs due to an increase in prostaglandin and *P. acidus* decreases yeast-induced pyrexia. Many pharma active compounds may be present in *P. acidus* which is responsible for the release of prostaglandins [16].

7. Antidiarrheal activity

P. acidus was tested for anti-diarrheal activity by methanolic extract through a special method in mice known as the castor oil-induced diarrhea method. 1 ml of castor oil of analytical grade was fed to every mouse which induce diarrhea. Fecal stools were observed and compared with the control one to find out the anti-diarrheal activity. The test was carried out in 3 groups such as control, positive, and test groups. Control group treated with (1% tween in normal saline) at a dose of 10 ml/kg body weight. A positive group with loperamide at the dose level of 50mg/kg and the test group induced with 200 and 400 mg/kg body weight of *P. acidus* methanolic extract. Pulp extract was found to be significant anti-diarrheal activity by the dose level of 200 mg/kg compared to other groups [18, 19].

Conclusion

Phyllanthus acidus is a crucial plant from pharmaceutical properties point of view. All most of all the part of the plant is having been used for the treatment of various diseases. It has established its recognition as a medicinal plant used as traditional medicine as well as current scientific research for pharmaceutical products. The plant *P. acidus* has antioxidant, antimicrobial, anti-inflammatory, antipyretic, analgesic, hepatoprotective, hypoglycemic, CNS depressant, anti-diarrheal activities, etc. The plant body is found with containing some important components mainly phenolics, tannins, glycosides, steroids, alkaloids, flavonoids, terpenoids, and saponins. Therefore, more scientific investigation is must needed on the detailed study of the plant, which may come out with significant novel pharmacological products. This may bring a remarkable revolution in the field of medicine and pharmacy.

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