



## A REVIEW OF PHYTOCHEMICAL AND BIOLOGICAL STUDIES ON *SONNERATIA APETALA*

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### ABSTRACT

*Sonneratia apetala* Buch-Ham is popularly known as Mangrove apple and it grows as tree or shrub, distributed throughout India in saline area. It contains polyphenols, flavonoids, anthocyanins and vitamin C as major constituents. The aerial parts of the plant contain a large no. of terpenoids, steroid, alkaloid & polysaccharide. The plant has been studied for antibacterial, antidiabetic and antioxidant activities. The present study is an attempt to review the phytochemical composition and biological activities of the plant.

**KEYWORDS:** Phytochemical, biological studies, *Sonneratia apetala*, antidiabetic, antibacterial, antioxidant, polyphenols.

### INTRODUCTION

*S. apetala* is a mangrove plant belonging to Lythraceae family. It is a fast growing mangrove use in the reforestation of salinity affected areas.

#### Geographical Distribution

It is found in Bangladesh, Sundarbans, Sri Lanka, Myanmar, Malaysia, Papua New Guinea and some parts of Africa and India including the Andaman and Nicobar islands. It has been introduced into Fujian and Guangdong provinces of China. *S. apetala* is a highly adaptable, fast growing plant that acts as a pioneer species in ecological succession in many degenerated mangrove forests (Chen *et al.*, 2003).

#### Local Uses

The ripe fruits are eaten by people from Africa to the Malayas and Javanese, and are said to taste like cheese. Ripe fruits are also used to expel intestinal parasites (Malay) and half-ripe fruit for coughs. In many regions, the fruits are also processed to produce sour sauce which is marketed. Fermented juice of this fruit is useful in arresting haemorrhage.

#### Phytochemical Composition

There are a few reports on the phytochemical composition of *S. apetala*. Methanolic extracts of *S. apetala* showed the presence of terpenoids, steroid, alkaloids, flavonoids, tannins, saponins and polysaccharide (Panda *et al.*, 2012). The crude leaves

extracts of *S. apetala* revealed the presence of anthrone and coumarin, however anthraquinones was also found in methanol and acetone leaves extract (Maurya, 2001). Beside this bitter principles (Maurya, 2004; Kale, 2006), coumarins (Maurya, 2004; Kale, 2006), essential oil (Maurya, 2004; Kale, 2006), flavonoids (Maurya, 2004; Kale, 2006; Tejaswi *et al.*, 2013; Patra *et al.*, 2014; Shefa *et al.*, 2014) and triterpenes (Ji *et al.*, 2005, Patra *et al.*, 2014; Shefa *et al.*, 2014) also recorded in this species.

#### Folklore Medicinal Uses

Folk Medicinal Healers in Bagerhat district of Bangladesh uses *S. apetala* as an Anti-inflammatory and to treat gastrointestinal disorders like dysentery, diarrhoea, indigestion, colic, acidity, bloating, lack of appetite, stomachache (Mollik *et al.*, 2010). Fruits and barks of the plant have remedial activities against asthma, febrifuge, ulcers, swellings, sprains, bleeding, hemorrhages and piles (Bandaranayake, 1998; Patra *et al.*, 2014). The leaves are widely used for dysentery, sprain and bruises, eye troubles (such as cataract) and open sores in children ears and also in heart troubles (Bandaranayake, 1995).

#### Biological Activities

Various biological activities like antimicrobial, antioxidant, antidiabetic etc. of *S. apetala* plant are studied.

### Antimicrobial activity

The antimicrobial activity of the plant was carried out on various microorganisms like *Staphylococcus auerus*, *Bacillus subtilis*, *Staphylococcus warneri*, *Escheretia coli*, *Klebsiella pneumonia*, *Pseudomonas putida*, *Pseudomonas aerugenosa*, *Proteus microbilis* and *Candida albicans*. The ethanolic extract of the plant showed good antibacterial activity with MIC 0.5mg/mL against both gram positive and gram negative microbes (Maurya, 2001). Rafat *et al* (2010) reported the antimicrobial activity of this plant extract on the various test microorganisms, including clinical multiple antibiotic resistant bacteria and phytopathogens. The antibacterial activity of *S. apetala* leaves (Jaimini *et al.*, 2011), aerial part (Panda *et al.*, 2012), leaf and bark (Patra *et al.*, 2014) and fruit (Hossain *et al.*, 2012) also reported.

### Antioxidant activity

When a reactive molecule such as reactive oxygen, reactive nitrogen and reactive chlorine species contains one or more unpaired electrons, the molecule is termed as a free radical (Chanda and Dave 2009). Free radicals derived from reactive oxygen species and reactive nitrogen species are generated in our body by normal cellular metabolism which is enhanced under stress conditions. The most vulnerable biological targets of free radicals are cell structures including proteins, lipids and nucleic acids. Since antioxidants synthesized in the body are not sufficient under oxidative stress, their exogenous supply is important to prevent the body from free radical-induced injury. To counteract these oxidative stress plants produce potent antioxidants that include both enzymatic and nonenzymatic antioxidant system (Asada 2006). As antioxidant is a molecule capable of slowing or preventing the oxidation of other molecules.

The antioxidant activity in leaves, stems, bark and root of *S. apetala* was observed by Banerjee *et al.*, (2008). Similarly leaves and bark (Patra *et al.*, 2014), pericarp and seed (Hossain *et al.*, 2016), fruit (Hossain *et al.*, 2012), bark (Mukul *et al.*, 2016), leaves, stem, bark and flowers (Vadlapudi and Naidu, 2009), leaves, stem and fruit (Quraishi, 2017) of *S. apetala* have shown antioxidant activity.

### Antidiabetic activity

The potency of herbal drugs is significant and they have negligible side effects than the synthetic antidiabetic drugs. There is increasing demand by patients to use the natural products with antidiabetic activity. In recent times there has been renewed interest in the plant remedies. Plants hold definite promises in the management of diabetes mellitus. The antidiabetic activity of *S. apetala* (Buch.-Ham) pericarp and seed was carried out by (Hossain *et al.*, 2012). Antidiabetic activity of the extracts was determined using streptozotocin (STZ) induced type 2 diabetes rats. The pericarp and seed extracts of *S. apetala* showed antidiabetic activity in diabetic rats when compared with diabetic control rats.

Patra *et al* (2014) also reported the antidiabetic activity in leaf and bark of *S. apetala*.

### Other medicinal properties

The anti-inflammatory potentials of the crude bark methanol extract of *S. apetala* was assessed through the membrane stabilizing activity by using acetyl salicylic acid as positive control. The methanol extract of bark of this plant was found to moderately inhibit the haemolysis of human erythrocyte (Mukul *et al.*, 2016). The Analgesic, antidiarrheal, anthelmintic and cytotoxic activity of *S. apetala* fruit extract was evaluated by Shefa *et al* (2014). The extract showed dose dependent analgesic, antidiarrheal, anthelmintic and cytotoxic activity. The anticancer activity of *S. apetala* was also reported by Patra *et al* (2014). The activity may probably be due to presence of various secondary metabolites such as phenolics in the plant extract which are responsible for decrease in tumor volume and the ascite fluid content in experimental mouse.

### CONCLUSION

Terpenoids, steroids, alkaloids, flavonoids, tannins, saponins and polyphenols secondary metabolites are seen in *S. apetala*. Scientifically it has been proved to be possess antimicrobial, antioxidant, antidiabetic, anti-inflammatory, analgesic, antidiarrheal, anthelmintic and cytotoxic activities.

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