

Review Article

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Indian Almond Tree (*Terminalia catappa* Linn.) as Herbal Biomedicine in Aquaculture Industry

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ABSTRACT

Aquaculture is growing drastically over the years with intensification. On the other hand intensification increased the stress, occurrence of diseases, introduction of new pathogens and application of the synthetic chemical substances to overcome these problems. Recently adoption of herbal medicine in aquaculture practices is becoming the trend due its advantages over the chemical substances. Plants are storehouses and sources of safer and cheaper chemicals. Numerous herbal plants have been identified for its anti-microbial, antifungal, anti-parasitic, growth promotion, appetite stimulation, immunostimulation and stress reducer properties. Indian almond tree (*Terminalia catappa* Linn.) is one among them. Tannin is the major chemical component of *T. catappa* which exhibits the antimicrobial property. The reports on use of Indian almond leaves as herbal biomedicine have been reviewed in the present article. The extensive work need to be done to optimize the dose and duration of treatment against the most common pathogens.

Keywords

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Herbal-
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Antifungal

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Introduction

Aquaculture is intensifying substantially in recent years, along with the high production there are several constrains in the intensification such as crowding which leads to stress and ends up with the outbreak of disease and crop failure. To control these disease outbreaks farmers are increasingly using the chemical components such as

Hormones, antibiotics and vitamins. Generally these chemical substances are introduced into culture systems without proper knowledge of dose, application methods, mode of action and degradation capacity. This may cause the side effects to culture animal, residual accumulation in the edible tissue and drug resistance in the pathogens. Adverse effects of antibiotics made increased the interest of consumer to

natural products (Fauci 1993). Plants are storehouses and sources of safer and cheaper chemicals (Chanu *et al.*, 2012). The herbs have been used in the treatment of human diseases and for revitalizing body systems during almost all ancient civilizations (Aftab and Sial 1999). The herbal medicine is considered to be safe and economical.

Preparations of herbal extract is most important factor in disease control during which active ingredients such as antioxidant, antimicrobial, antistress, growth promotion, appetite stimulation, tonic and immunostimulation, and aphrodisiac properties should not be lost (Chanu *et al.*, 2012). In general herbal properties of the plants are related to the availability and activity of compounds such as alkaloids, flavonoids, pigments, phenolics, terpenoids, steroids and essential oils.

Indian almond tree (*Terminalia catappa* Linn.) is a large tree, which can reach up to 30 m height with a thick broad trunk; the leaves cluster toward the end of the branches (Whistler, 1992). Leaves and barks of Indian almond tree are widely used in human as a traditional medicine to treat hepatitis, dermatosis, oral infections, and intestinal ailments in children and adults. Decoction of the leaves is used to treat indigestion, furred tongue, bronchitis and tuberculosis (Whistler, 1992).

Recent reports shows that extracts of leaves and barks has properties such as (1) Anti-cancer (2) Anti-oxidation (3) anti-inflammation (4) antifungal properties (against *Pythium ultimum*, *Rhizoctonia solani*, *Sclerotium rolfsii*, and *Aspergillus fumigates*) (5) and antibacterial properties (against; *Staphylococcus epidermidis*, *S.aureus*, *Bacillus cereus*, *B. subtilis*, and *Pseudomonas aeruginosa* (Nantarika Chansue and Nongnut Assawawongkasem, 2008).

Chemical composition of the Indian almond leaves

The chemical compositions of this plant contains tannins (punicalagin, punicalin, terflavin A and B, tergalagin, tercatatin, chebulagic acid, geranin, granatin B, corilagin), flavanoids, isovitexin, vitexin, isoorientin, rutin and triterpenoids (ursolic acid, 2 α , 3 β , 23-trihydroxyurs-12-en-28 oic acid) (Ahmed *et al.*, 2005).

Tannin is a polyphenolic compound consisting of antibacterial properties (Chung *et al.*, 1998).

Indian almond leaves as Herbal medicine

Indian almond leaves has been locally claimed to be a wound healing substance for Siamese fighting fish hurt after matches (Liu *et al.*, 1996). Chansue *et al.*, (2004) opined that the leaves have a potential to use as an alternative treatment for chemical substances and antibiotics.

Anti-microbial

The antibacterial active principles of the herbals may lyse the cell wall, block the protein synthesis and DNA synthesis, inhibit the enzyme secretions and interfere with the signalling mechanism of quorum sensing pathway (Citarasu, 2009). The crude ethanol extract from the leaves of Indian almond has been observed to be active against *Staphylococcus aureus* with a minimum inhibitory concentration of 512 μ g/ml (Burapadaja, 1997).

Indian almond, *Terminalia catappa*, extract is an alternative antibacterial remedy against tilapia bacterial pathogen *A. hydrophila*. The growth of two strains of *A. hydrophila* was inhibited at a concentration of 0.5 mg mL (Chitmanat *et al.*, 2005).

Anti-parasitic

Indian almond (*Terminalia catappa*) have been reported (Chitmanat *et al.*, 2005) to treat tilapia fish ectoparasites viz., *Trichodina* sp. The infected fish become lethargic generate excessive mucus and become off feed eventually which results in considerable deaths. Chitmanat *et al.*, (2005) observed that the crude extracts of Indian almond at 800 mg/L significantly ($P < 0.05$) eliminated the *Trichodina* sp. infections in tilapia (average weight 3.62 ± 0.06 g each). According to these investigators Indian almond at 800 ppm was effective in eradication of *Trichodina* sp. from tilapia after 2-day treatment.

The leaf extracts can eliminate *Zoothamnium spp.* infection of black tiger post larva shrimp within 24 hours after exposure (Watchariya *et al.*, 2004) and also has potential to decrease the number of *Gyrodactylus* and *Dactylogyrus* infection of gold fish (Chansue and Tangtrongpiros, 2005).

Anti-fungal

The herbal extracts involve the fungal cell wall lysis, altering the permeability, affecting the metabolism and RNA and protein synthesis which leads to death (Citarasu, 2010). Chitmanat *et al.*, (2005) showed that Indian almond leaves (*Terminalia catappa*) extract reduced the fungal infection in tilapia eggs. The crude extracts of *T. catappa* had in vitro antifungal properties against *Pythium ultimum*, *Rhizoctonia solani*, *Sclerotium rolfsii*, and *Aspergillus fumigatus* (Goun *et al.*, 2003).

The limited study has been done on application of Indian almond leaves as herbal biomedicine. The extensive works on the test trials and toxicity study is needed in order to popularize and commercialize the herbal biomedicine.

Application of herbal biomedicine is a possible way to reduce the use of synthetic chemical substances and to overcome its constraints such as side effects, residual issues and drug resistivity. Indian almond leaves have the properties of herbal biomedicine, the extensive work need to be done to optimize the dose and duration of treatment against the most common pathogens.

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