



BENEFITS OF USING CATAPPA LEAVES (*Terminalia catappa*) IN A FRESHWATER AQUARIUM

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Abstract: The *Terminalia catappa*, commonly known as the Catappa tree, has gained widespread popularity in tropical and subtropical regions. Its leaves, also referred to as 'Indian Almond', have become an essential component in small-scale freshwater aquariums. As they decompose, these leaves release tannins, imparting beneficial properties to the aquatic environment. This comprehensive review delves into the diverse advantages of Catappa leaves, encompassing their antifungal, antimicrobial, growth-promoting, and disease-preventing attributes. Furthermore, their ability to replicate natural habitats, particularly in Betta fish breeding, is examined. The review also explores their role in enhancing fry survival, nurturing beneficial microorganisms, and detailed methods for their preparation and application in aquariums.

Index Terms: Fish, Freshwater aquarium, Tannin, *Terminalia catappa*,

INTRODUCTION

The Catappa tree (*Terminalia catappa*), a member of the Combretaceae family, goes by various names including Almond, Lingtak, Bastard Almond, Telisai, Jelawai, Indian Almond, and Ketapang [1]. However, 'Indian Almond' is the most widely recognized trade name for this tree [2]. While native to Asia, it has found success in thriving within numerous tropical and subtropical regions worldwide. Notably, Catappa leaves have been a staple among small-scale aquarium enthusiasts since their early use to the present day. As they decompose, these leaves release a plant-based yellow-brown tinting compound known as tannins [3]. These pigments boast a range of properties that significantly benefit freshwater aquarium setups.

ANTIFUNGAL AND ANTI-MICROBIAL PROPERTIES

Catappa leaves contain various active ingredients, each possessing distinct properties. According to Kiparissis, one such active ingredient is Tannin, which acts as a bacterial growth inhibitor in the fish's intestinal tract by forming a chelate through iron binding [4]. Additionally, the presence of fulvic acid, tannin acid, and humic acid in the leaves leads to a slight acidification of the water. This alteration renders the environment inhospitable to many fish pathogens, enhancing the overall health of the aquatic system [2].

IMPACT ON FISH GROWTH

Growth, as defined by Effendie, refers to the progressive development in both weight and length over time [5]. In a study conducted by Nurhidayat et al, the effects of Catappa leaf dosage on fish growth were examined using four different concentrations. The containers with Catappa leaf doses of 0.5g/L, 1.5g/L,

and 0g/L yielded lengths of 1.12cm, 1.05cm, and 0.74cm respectively. The highest body weight of 0.092g was observed with the 0.5g/L Catappa extract dosage, while the lowest weight of 0.080g was reported in the controlled container without Catappa extract [6]. This demonstrates a positive correlation between Catappa leaves and fish growth. This enhanced growth can be attributed to active compounds within the leaves, such as quinones and phenolics, which serve not only as appetite stimulants and stress-reducing agents but also as growth promoters [7].

DISEASE PREVENTION

Pandey's study demonstrates that Catappa leaf extract serves as a biomedicine, fostering a non-specific defense mechanism that can enhance specific immune responses [8]. Additionally, in a 2016 study by Nugroho et al, the health status of fish was examined using hematological profiles, reflecting the physiological state of the fish's body. It was observed that the presence of Catappa leaf extract led to an increase in the fish's white blood cell count, indicating an improvement in immunity [7]. This underscores the potential of Catappa leaves in bolstering fish health and disease resistance.

MIMICKING NATURAL HABITATS

Utilizing Catappa leaves presents an economical botanical approach to replace costly chemical treatments, while also facilitating the creation of visually stunning blackwater aquariums. The primary objective of these aquariums is to replicate the natural ecosystem of fish, providing them with an environment akin to their native habitat. Moreover, this approach helps to adjust the water's pH, making it slightly acidic, which is preferred by numerous fish species [2].

Catappa leaves find their greatest popularity among traditional Betta fish breeders, particularly in comparison to other species. This is attributed to the tannins present in the leaves, which closely mimic the natural habitat colors of Bettas, resembling environments like paddies and vernal pools [7]. While soft water fish may not require low pH levels for their daily well-being, maintaining a mildly acidic environment can significantly enhance the success rate of breeding and raising fry [3].

ENHANCING FRY SURVIVAL

As defined by Effendie, fry survival rate refers to the percentage of viable offspring in relation to the total amount in a container [5]. This rate is heavily contingent on the conditions of the aquatic environment. Over time, the decomposition of debris and fish waste results in the production of toxic compounds, ultimately disrupting the metabolic system of the fish's body [9].

Nikolsky's findings[10] suggest that the addition of antioxidants can mitigate the toxicity of these by-products. Catappa leaves contain such antioxidants, including saponin, flavonoids, and the previously mentioned tannin. It's worth noting that the concentration of these antioxidants varies with the color of the leaves. According to Nurhidayat et al., red-colored leaves exhibit the highest antioxidant concentration [6]. However, an excess amount of Catappa leaf extract can lead to a reduction in the survival rate, potentially due to the challenges of locating food in the resulting dark, concentrated water [11]. In the aforementioned study by Nurhidayat et al., containers lacking Catappa leaf extract showed a decrease in the survival rate, likely attributable to the absence of antibacterial effects and increased susceptibility to fungal attacks [6]. Furthermore, the presence of saponin in Catappa leaves leads to an increase in red blood cell count (RBC) and hemoglobin in fish, resulting in heightened oxygen intake and overall improved fish health [12].

LEAF DECOMPOSITION AND BENEFICIAL MICROORGANISMS

When a Catappa leaf is introduced into an aquarium, decomposing microorganisms begin to consume and break it down, forming a biofilm, also known as Microfuna. This biofilm eventually becomes a valuable food source for small fish fry [3].

In the study by Nugrhos et al. on the Effects of Terminalia catappa L. Leaves Extract on the Water Quality Properties, Survival, and Blood Profile of Ornamental Fish (Betta sp) Culture, it is noted that the presence of compounds such as quinone, phenolic, tannins, saponin triterpenoid, and flavonoids confer beneficial properties against pathogenic microorganisms. Additionally, these compounds support the growth of microorganisms that contribute to the formation of biofilm, creating a habitat for a beneficial micro-ecosystem [7].

PREPARING AND USING CATAPPA LEAVES

There are two common methods for incorporating Catappa leaves into an aquarium. Some individuals prefer to use the leaf in its natural form, allowing it to decompose gradually and release tannins over time. Others opt to use Catappa leaf extract, which can be obtained by boiling the leaves or by using commercially available Catappa leaf powder [3].

CONCLUSION

The merits of Catappa leaves in aquarium maintenance are indisputable. Their natural tannin infusion, coupled with antifungal and antimicrobial properties, offers a chemical-free alternative for water conditioning. Additionally, their impact on fish growth and disease prevention underscores their pivotal role in maintaining aquatic well-being. The leaves' ability to mirror natural habitats, especially for Betta fish, and their contribution to enhancing fry survival highlight their significance in breeding programs. Furthermore, their support in cultivating beneficial microorganisms and user-friendly applications solidify their status as an indispensable tool for aquarists. Catappa leaves exemplify the harmonious relationship between nature and aquarium ecology, providing a cost-effective and environmentally conscious solution for enthusiasts worldwide.

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