

Utilization of Herbal Plant in The Treatment of Fish Disease

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ABSTRACT

It is not advised to continuously employ chemicals to control fish disease because doing so would harm the organisms that are being treated with them. The consequences include the eradication of organisms (Sabrina et al. 2014). Utilizing plants that have anti-fungal properties to stop the growth of the Saprolegnia fungus is one solution that can be used. Torch ginger (Nicolia speciosa Horan), papaya leaf, and guava leaf are some of the medicinal herbs that may be antifungal. Natural active ingredients found in herbal plants have advantages when used to protect fish from illness. This is because it contains active substances, which are widely distributed in nature and do not have any negative side effects when used. According to the findings of phytochemical experiments, these plants contain phenols, tannins, alkaloids, and flavonoids as their main chemical constituents. This review provides a quick overview of the potential and capabilities of each of these plants.

Keyword: active ingredient, fish disease, guava leaf, papaya leaf, torch ginger

1. INTRODUCTION

One of the diseases that often infect fish and fish eggs is saprolegniasis caused by the fungus *Saprolegnia* sp. Which can cause a decrease in the hatching rate of eggs. *Saprolegnia* sp. is a heterotrophic fungus and reproduces by spores, and lives in fresh water. Saprolegnia fungi in general can attack most fish eggs that live in fresh water. When the *Saprolegnia* sp. fungus attacks the egg, the hypha will attach and penetrate the egg chorion and cause the egg chorion to become vulnerable [1].

Some of the chemicals commonly used to treat infection initiated by the fungal disease Saprolegnia include malachite green, methylene blue and formalin. However, controlling disease by using a chemical continuously is not recommended, because using chemicals will have a negative impact on organisms treated using these chemicals. The negative impacts caused include killing organisms [2]. One alternative that can be used is to use plants that contain anti-fungal compounds so that they can inhibit the growth of the Saprolegnia fungus.

One of the medicinal plants that have the potential as antifungal is torch ginger (*Nicolia speciosa* Horan), papaya leaf and guava leaf. Based on the results of phytochemical tests, the compounds contained in these plants are phenols, tannins, alkaloids, and flavonoids [3]. The potential and capabilities of each of these plants are briefly described in this paper.

2. TORCH GINGER

Torch ginger plant is an annual plant in the form of a shrub with a height of 1-3 m. This plant has a pseudo stem, erect, has a midrib and green in color. The length of the leaves is about 20-30 cm with a width of 5-15 cm. Its flower is a hump-shaped flower with a stalk/twig length of 40-80 cm [4]. The classification of torch ginger (Figure 1) according to [4] is as follows:

Kingdom	: Plantae
Division	: Spermatophyta
Class	: Monocotyledoneae
Order	: Zingiberales
Family	: Zingiberaceae
Genus	: Nicolaia
Species	: <i>Nicolaia speciosa</i> Horan



Figure 1. Torch ginger flower

In certain areas, torch ginger is usually cooked as a vegetable, and can also be used as fresh vegetables. There are several other names for torch ginger flowers that grow and are commonly called *honje*, *kincung* (Medan), *siantan* (Malay), *kantan flower* (Malaysia). Torch ginger flowers have several groups of active compounds, these compounds are tannins, flavonoids, alkaloids, phenols, saponins, [3]. In the leaves, stems and flowers of torch ginger there are saponins, tannins and flavonoids compounds. Torch ginger also contains essential oils [5]. Based on the test results of 25 grams of torch ginger flowers the content of tannins contained in torch ginger flowers is 4.306%. Based on the test results of 25 grams of torch ginger flowers the content of tannins contained in it is 4.306%. Based on the results of phytochemical tests, the compounds contained in torch ginger flowers are as follows:

Table 1. Phytochemical Results of Torch Ginger Flower Extract

Phytochemical Analysis	Results
Tannins	+
Alkaloids	+
Flavonoids	+
Phenolic	+
Saponins	+
Phenol Hydroquinone	+
Triterpenoids	+

Description: (+) Contains metabolite compounds, (-) Does not contain metabolites

3. PAPAYA LEAF

Papaya is a plant that is widely cultivated in Indonesia, usually planted in yards or in gardens. But actually, this plant is not native to Indonesia. This papaya plant comes from the area around Mexico and Costa Rica. Papaya plants are estimated to have entered Indonesia in the 19th century (1925-1930) [6]. Papaya (*Carica papaya* L.) which in Java is known as *kates* and *ketela gantung* is a plant whose whole organs can be used for both humans and animals.



Figure 2. Papaya Plant (*Carica papaya* L.)

According to [7], the papaya plant is a tree-shaped shrub with a straight, cylindrical stem, the inside is spongy and hollow, outside there are many leaf marks, 2.5-10 m high, the leaf blades are ovate round, leaf spines are finger shaped, the diameter is 25-75 cm, *taju* part is always curved irregularly. Papaya plants can grow in the lowlands to an altitude of 1000 m above sea level [8]. Papaya plants have a root system in the form of taproots and branch roots that grow horizontally in all directions at a depth of 1 m or more and spread about 60 cm - 150 cm. The leaves are single and large with long, hollow petioles. The flowers consist of three types, namely male flowers, female flowers, and true flowers.

According to the study, 100 grams of dried papaya leaves have a composition of 7.92% water, 7.73% ash, 30.68% protein, 19.32% crude fiber, 1.13% crude fat, 41.14% carbs, and 3742 kcal/kg gross energy. Papaya leaves include 35 grams of calcium, 63 mg of phosphorus, 0.80 mg of iron, 136 mg of vitamin E, 0.15 mg of vitamin B₁, and up to 140 mg of vitamin C.

Papaya leaves contain carpaine alkaloids, saponins, carposids, flavonoids, anthraquinones, steroids, and papain enzymes. Carpaine alkaloids are the largest group of plant active compounds. These alkaloids can lower blood pressure and kill microbes [8]. These alkaloids and saponins are dominant in contributing to the bitter taste of papaya leaves. These compounds act as antioxidants, antibacterial, anticancer, and anti-inflammatory.

4. GUAVA LEAVES

Guava leaves (*Psidium guajava*) originally comes from tropical America, grows on loose or clay soil, in the open and contains quite a lot of water. White guava plants can flower throughout the year. This plant often grows wild and can be found at an altitude of 1-1,200 meters above sea level [9]. Botanically, guava plants are classified as follows:

Kingdom	: Plantae
Division	: Spermatophyta
Class	: Dicotyledoneae
Order	: Myrtales
Family	: Myrtaceae
Genus	: <i>Psidium</i>
Species	: <i>Psidium guajava</i> L.

Guava is one of the plants that carry out the process of photosynthesis to produce energy which will be used in various processes. The substances resulting from photosynthesis will later be used to carry out life activities. Plants produce secondary metabolism which functions to protect the plant from its environment such as attacks from insects, bacteria, fungi and other types of pathogens [10]. Secondary metabolite compounds are chemical compounds that generally have bioactivity capabilities and function as plant protectors from pests and diseases for the plant itself or its environment. Chemical compounds as a result of secondary metabolites have been widely used for dyes, poisons, food, medicine and so on. Several types of plants contain chemicals resulting from secondary metabolism in the form of flavonoids, alkaloids, saponins, steroids, terpenoids and triterpenoids [11]. Guava leaves contain 9-12% tannins, essential oils, fatty oils and malic acid. Tannins have antiseptic properties that prevent damage caused by bacteria or fungi. The benefits of guava leaves (*Psidium guajava* L.) have been proven to accelerate the healing of skin infections which are usually caused by *Staphylococcus aureus*, *Streptococcus* spp, *Escherichia coli*, *Salmonella typhi*, *Proteus mirabilis*, and *Shigella dysentery* bacteria.

Guava leaf extract was obtained by maceration using an ethanol solution. The concentration of ethanol used affects the amount of tannin in the extract. Ethanol content of 70% attracts more tannins and is the optimal concentration to produce yield [12]. The results of phytochemical screening, guava leaves contain secondary metabolites, consisting of the main component of guava leaves is tannins which amount to 9-12%. Tannins are antibacterial by precipitating proteins. The antimicrobial effect of tannins through reactions with cell membranes, inactivation of enzymes, destruction or inactivation of the function of genetic material. Alkaloids, flavonoids can inhibit the growth of bacteria. The content of compounds in guava leaf extract is listed in the Table 2.

Table 2. Compound Composition in Guava Leaf Extract

Compound	Content
Tannins	9-12%
Flavonoids	1,17%
Essential Oil/Eugenol	0,4%
Fat Oil	6%
Recin	3%
Guajaverin	13,5%
Quercetin	0,86-7,41%

Source: [12]

5. APPLICATION OF HERBAL PLANTS ON FISH

Research on the use of herbal plants as anti-diseases in fish has been carried out. The results showed that herbal plants were able to prevent and treat several types of diseases in various types of fish (Table 3).

Table 3. Applications of Herbal Plants and Their Responses to Several Types of Fish

Plant	Treatments	Result	Reference
Papaya Leaves (<i>Carica papaya</i> L)	The effectiveness of papaya leaf extract (<i>Carica papaya</i> L) on gouramy eggs	Papaya leaf extract was able to inhibit fungal infections in gouramy eggs. The administration of papaya leaf extract significantly affected the prevalence, hatchability, and survival of gouramy eggs where the recommended dose was 3000 ppm.	[13]
India almond (<i>Ketapang</i> leaf) (<i>Terminalia cattapa</i>)	Utilization of ketapang leaf extract for the prevention and treatment of catfish infected with <i>Aeromonas hydrophila</i>	In an in vivo test on catfish, prevention using ketapang leaf extract at a dose of 60 g/l showed more effective results in preventing <i>A. hydrophila</i> infection.	[14]
Torch ginger flower (<i>Nicolaia speciosa</i> Horan)	The effectiveness of torch ginger flower extract for the prevention of <i>Saprolegnia</i> sp. on <i>Sangkuriang</i> catfish	Torch ginger flower extract solution effectively inhibited the growth of the fungus <i>Saprolegnia</i> sp. The best concentration of torch ginger flower extract at 60 ppm could prevent saprolegniasis, the lowest was 39.44% and gave the highest egg hatchability of 60.56%.	[3]
Turmeric (<i>Curcuma domestica</i>)	Turmeric extract as an anti-bacterial <i>Aeromonas hydrophila</i> in <i>Pangasius</i> sp. catfish	Based on the research that has been done, it can be concluded that the results of the ANOVA test (analysis of variance) showed that the soaking of turmeric extract significantly affected the survival value of catfish infected with <i>A. hydrophila</i> bacteria and the highest survival value of	[14]

		catfish (<i>Pangasius</i> sp.) was obtained in the treatment. E (0.7 ppt) which is 77.5%	
Singapore cherry leaf (<i>Muntinga calabura</i> L)	The effectiveness of Singapore cherry leaf extract for the treatment of tilapia fry infected with <i>Aeromonas hydrophila</i> bacteria	Singapore cherry leaf extract is effective for the treatment of tilapia fry infected with <i>Aeromonas hydrophila</i> . The concentration of 60 ppm resulted in the fastest recovery on the fourth day and the highest survival rate of 81.67%.	[15]

6. CONCLUSIONS

Herbal plants are natural active compounds that have advantages in their use to prevent disease in fish. This is due to the active compounds contained in it, the availability of which is abundant in nature and does not cause harmful reductions after its use. Research results show that the use of several herbal plants is able to prevent and treat diseases of several types of fish.

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