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DADAP (*ERYTHRINA SUMBUBRANS*) AS HINDU ETHNOMEDICINE FROM LONTAR USADHA TARU PRAMANA

Ni Ketut Sinarsih[1], Mery Ambarnuari[2], I Gusti Agung Ayu Kartika[3]

[1,2,3]Universitas Hindu Negeri I Gusti Bagus Sugriwa Denpasar
Email : nktsinarsih@uhnsugriwa.ac.id [1], mery.ambarnuari@gmail.com[2]
ayukartika@uhnsugriwa.ac.id[3]

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Abstract :
Dadap (*Erythrina sumbubrans*), a plant native to Bali, has been one of the foundations of Balinese ethnomedicine and Hindu ceremonies for centuries. delves into the multifaceted role of *Dadap* in traditional healing practices and its cultural significance within Hinduism. The plant is characterized by its expansive green, heart-shaped leaves and vibrant red flowers, which are highly valued for their medicinal and spiritual properties. In Hindu ceremonies, *Dadap* is respected as "*kayu sakti*," a sacred wood believed to possess magical powers. Its leaves are used in various rituals, including the Pitra Yadnya and Dewa Yadnya ceremonies, where they serve as guiding woods to ensure the deceased find a favorable path to Brahman. The plant`s bioactivity and phytochemical composition have been extensively studied, revealing its potential as an anti-inflammatory, antimicrobial, antipyretic, and antimalarial agent. The Usada Taru Pramana Lontar, a traditional Balinese healing text, provides detailed information on the medicinal uses of *Dadap*. The text describes how the plant's leaves, bark, and roots can be used to treat various ailments, including fever, internal bleeding, and digestive disorders. Scientific studies have validated these traditional uses, demonstrating the efficacy of *Dadap* extracts in reducing body heat and alleviating pain. This article aims to contribute to the preservation of Balinese cultural heritage by examining the empirical and scientific evidence supporting the medicinal and spiritual significance of *Dadap*. It highlights the potential for modernizing traditional medicine practices in Bali, while also emphasizing the importance of understanding the phytochemical properties of the plant to ensure safe and effective use.

Key Words : *dadap, Erythrina sumbubrans, etnomedicine, taru Pramana*

INTRODUCTION:

Bali Island, which is one of the islands in Indonesia, has long been known as an island rich in culture, traditions, and heritage of traditional medicinal plants. One prominent aspect of Bali's traditional medical heritage is the use of medicinal plants, which have been part of Balinese empirical healing practice for centuries. One of the plants that dominates Balinese ethnomedicine practices is *Dadap* (*Erythrina sumbubrans*). *Dadap* (*Erythrina sumbubrans*) is a plant that is widely known in Bali by the local name "*Dadap*". This plant is characterized by large green, heart-shaped leaves with beautiful bright red flowers (Lestari & Astuti, 2024).

The *dadap* plant has long been used by the Balinese people as part of a traditional healing system and has many benefits, so the *dadap* plant is called the sacred wood. (Kadek et al., 2020). The use of *Dadap* leaves is not only by Hindus in Bali and the archipelago. In India, it

also has a very vital role. When Hinduism spread to Bali, *Dadap* leaves were also involved in various religious rituals so their existence was very much needed, especially as a means for cleansing or *Prayascita*. *Dadap* not only functions as a *Prayascita* but is also used as a *turus lumbung* or to build a temporary *pelinggih* (Astini, 2020). In the construction of *pelinggih* or *turus lumbung*, the *dadap* tree functions as a *Pratista*, namely to establish the *Ista Dewata* because in the teachings of Hinduism, the power of the Ista Dewata cannot be guided if the *Dadap* tree is not used. This is the reason *dadap* is called *taru sakti* by Hindus.

Apart from its beauty and use in religious activities, *dadap* has a long history as a traditional medicinal plant in Bali. It can be used in various medicinal contexts, such as treating various diseases, reducing pain, and alleviating digestive disorders (Wedani et al., 2022). The system of treatment using medicinal plants has been used since ancient times before the existence of modern systems of medicine. This fact is known through the existence of various *Lontar Usada* which contain knowledge about various ways to establish diagnosis, therapy, prevention, maintenance, and treatment of various diseases. The benefits of *dadap* are empirically strengthened by the inclusion of this plant in one of the traditional Balinese healing texts, namely *Usada Taru Pramana*.

Lontar Usadha Taru Pramana is one of the traditional Balinese texts that contain extensive knowledge regarding the use of traditional medicinal plants, including *Dadap* for medicinal purposes (Wedani et al., 2022). This Lontar has become a valuable source of information that supports traditional Balinese healing practices that continue to pass on knowledge about the use of medicinal plants from generation to generation. In the *Taru Pramana* text, *Dadap* is one of the most important plants used in the *usada* process. Empirically, *taru Dadap* is considered to have a *tis* effect so it is often used for heat pain, such as internal heat, and is used as *loloh* (herbal medicine) because it is thought to reduce internal heat.

The low level of public knowledge, especially in reading Balinese script, has caused the contents of Usada Taru Pramana to be almost unknown. Moreover, the Usada Taru Pramana manuscript in the form of lontar is difficult to obtain. The limitations of inheritance methods have resulted in traditional medical knowledge being increasingly pushed aside by the superiority of modern medical knowledge in facing changes in the paradigm of society. An interesting fact about traditional medicine in Bali, especially Usada Taru Pramana, is that it is still believed and utilized by the community and has many benefits for sick people .

Currently, there has been a lot of research exploring the potential of medicinal plants by proving their bioactivity and analysing the phytochemicals they contain to find out the mechanism of the active substances in these plants in overcoming various health problems. (Sinarsih et al., 2021). These scientific studies will certainly support the development of traditional medicines that were previously used empirically into Balinese *Usada* treatments that are more convincing and can be responsibly applied. Moreover, most people do not know scientifically about the benefits of plants that can be used in traditional medicine. Generally, almost all parts of plants have their properties, including leaves, flowers, fruit, seeds, bark, stems, and even roots. Likewise, *dadap*, the leaves, bark, and roots are often used as *boreh* (*parem*) to reduce heat.

From a scientific perspective, *Dadap* has been explored in several studies for its medical potential. Bioactivity studies aim to identify active compounds in plants that are responsible

for their therapeutic effects. Phytochemical studies help in identifying chemical compounds such as alkaloids, flavonoids, tannins, and other may be involved in the pharmacological effects of plants (Twaij & Hasan, 2022). The results of the study on bioactivity and phytochemistry are expected to provide a deeper understanding of the medical potential of *Dadap* (*Erythrina sumbubrans*) as part of Bali's ethnomedicine heritage. Based on the facts that have been presented, this article aims to examine the background of the importance of *Dadap* (*Erythrina sumbubrans*) in Balinese ethnomedicine practice, with a focus on the study of bioactivity and phytochemistry, so that it can provide a valuable contribution to the maintenance of cultural heritage and the study of the benefits of plants as a whole. Scientific knowledge that can be used in traditional medicine. The knowledge gained from this research could open the door to the development of modern *Dadap*-based medicines or even promote sustainable traditional medicine practices in Bali. Additionally, a further understanding of *Dadap*'s phytochemistry can provide insight into potential dangers or side effects that need to be considered in its traditional use.

METHODOLOGY

This article is a descriptive article with a structured article review method prepared based on the study and analysis of various research results in online scientific articles. Research data was obtained from primary literature related to the phytochemistry and bioactivity of *dadap* plants. Data Collection was obtained from Google Scholar, PubMed, and Science Direct databases. The library sources used are the results of research published in national and international journals from 2014 to 2024. The search for library sources was carried out using the keywords, "*Dadap* in Taru Pramana", “Erythrina sumbubrans”, “bioactivity of Erythrina sumbubrans”, “Phytochemical of Erythrina sumbubrans”.

The initial stage is carried out by identifying by exploring related library sources in the form of online scientific articles using appropriate keywords. The articles selected for the next stage are articles that have a title and abstract that match the keywords. The second stage was to select appropriate abstracts from the articles found. Articles that meet the specified eligibility requirements will be downloaded in their entirety. The final stage is carried out by selecting based on the suitability of the contents of the manuscript as a whole.

This research uses inclusion criteria, namely library sources which are original research whose manuscripts can be accessed in their entirety and were published in the last ten years. If the article meets all the inclusion criteria but is not related to the research theme, then the article is excluded. The results of the article screening are presented in tabular form, combined to obtain a synergistic analysis and conclusions from a comparison of library sources regarding the phytochemistry and bioactivity of *dadap* plants.

RESULTS AND DISCUSSION

Dadap as Kayu Sakti for Hindus

The dadap used in Hindu ceremonies in Bali is generally a type of *dadap* that has leaves that always have three branches. The meaning of these three branches is as a symbol of the Tri Murti, namely the three manifestations of Ida Sang Hyang Widhi Wasa as creator, preserver, and melter through the function of pralina (Astini, 2020). *Dadap* leaves are believed to be a tree that has magical taru sakti. The use of *dadap* leaves is not only carried out by Hindus in Bali but also by Hindus from the archipelago and even India. This can be seen in mythology,

where the *Dadap* leaves, which in Sanskrit are called Mandara, are closely related to the Ksirarnawa story. The *Dadap* tree grows when the ocean of milk is churned. Where, when the Gods want to take Tirta Amerta (tirta of immortality) two great powers are needed, namely the giant's power and the power of the gods to turn Mount Mandara Giri. Before Amerta was discovered, several sacred plants emerged from the rotation of Mount Mandara Giri carried out by the Giants and the Gods, one of which was the *Dadap* leaf. Therefore, *dadap* leaves are called Mandara leaves because they appear when rotation of Mandara Giri. This leaf was then taken by Dewa Indra and taken to be planted in Heaven. So, this plant is considered as Panca Wrska or one of the five plants of Heaven.

In religious ceremonies, *dadap* wood plays an important role, apart from being used in every moment of a religious ceremony, *dadap* wood is also the most important part of a ceremony. During the Pitra Yadnya ceremony, *dadap* wood becomes a guiding wood for the sekah of deceased people to provide a path for those who have died so that they can get a good path on their journey to unite with Brahman. In the Dewa Yadnya ceremony, the function of *dadap* wood is not only used as a guide in the offerings, but *dadap* wood also has other important functions. For example, this function is used in many types of *dadap* wood, such as tegen-tegenan and so on.

Dadap (Erythrina sumbubrans) in Lontar Usadha Taru Pramana

The Usadha Taru Pramana Lontar is one of the lontars that contains a variety of types of medicinal plants and their use in traditional Balinese medicine. Plants in Taru Pramana palm leaves can treat a disease, and certain parts of plants such as leaves, fruit, bark, roots, and buds can be used as medicine in the form of external medicine and internal medicine. The use of medicines is very diverse, such as param (Boreh), compresses, sprays, drops, and herbal medicine (Loloh). There are also parts of plants that need to be mixed with other ingredients, both those that come from plants and those that are minerals, such as salt, chalk, warangan. One of the plants contained in the Taru Pramana palm leaf is *dadap*, a plant that has been empirically proven to have various medicinal properties in Bali and is known as kayu sakti. The most common use of *dadap* as a treatment in Bali is by pounding it and then placing it on a hot forehead, or on a body that has recently been injured (Negeri et al., 2024).

In the Usada Taru Pramana Lontar manuscript, there are several sentences related to the properties of *dadap* as a plant that has medicinal properties, which read:

“Tiang taru *dadap* tis wau rauh, daging titiang tis, babakan titiang dados anggen tamba bengka, malih campur ipun, katumbah bolong solas besik, uyah areng, tektek dedekan, peres, saring, tur anginum. Malih babakan titiang, maka pinulung ring penyungkan weteng, campur sareng sendrong menyahnyah, rajang halus, wau simbuh ring weteng rare”

“Tiang taru *dadap* tis wau rauh, daging titiang tis, babakan lan don titiang dados anggen tamba bengka. Malih don titiang, maka pinulung ring penyungkan weteng, ambil don titiang, ulig utawi bejek sareng cocor bebek. Dagingin toya, bejek. Yening sungkan bengka, balur campuran punika ring weteng rare”

Means:

“I am *dadap* tis tree has just arrived, my substance content is cool, and the bark of my trunk

can be used to treat flatulence, a mixture of eleven coriander seeds, charcoal salt, finely chopped, squeezed, strained, and drunk. Likewise, my bark is used to help babies with colic, mixed with a spice, roasted, and then sprayed on the baby's stomach."

"I am *dadap* tis tree, my substance content is cool, my bark can be used for medicine for flatulence. Take my leaves, mash them with a duck beak, add water, mash them again. If you have a stomachache, apply the mixture to your child's stomach".

Based on the contents of the palm leaf, it can be seen that *dadap* can not only be used as a single ingredient in medicine but is given several combinations of plants that increase the efficacy of *dadap* in several types of medicine. Dadap plants are included in the papilonaceae family and are plants that have many benefits as traditional medicine, especially in Bali. Dadap leaves have benefits as a medicine for fever for women (postpartum fever), breast milk stimulants, internal bleeding, stomach ache, prevent miscarriage, while the bark can be used as a phlegm thinner (Hidayah et al., 2019).

Traditional medicine using medicinal plants has been carried out for generations by people in ancient times. Historically in Bali, the use of Dadap leaves as a medicine for fever in children has been carried out since the time of the Hindu kingdom in Bali. The use of Dadap originated from the habit of people in Bali using Dadap leaves as a traditional compress to reduce fever from generation to generation .
The benefits of *dadap* as a plant have been scientifically proven from the ability of its leaf extract to effectively reduce body heat or reduce fever, which is formulated in the form of a hydrogel preparation with an extract concentration of 16.67% and 33.33% (Medfarm et al., 2019). Research on the benefits of dadap leaves in reducing fever was also conducted by Hajaroh et al., 2023 with the results that dadap serep leaf compresses were effective in reducing the body temperature of toddlers after DPT immunization in Moarah Village, Bangkalan (Hajaroh et al., 2023). These studies show that the benefits of *dadap* leaves that have been carried out by the community and proven empirically also show results that are comparable to the benefits of *dadap* itself which have been proven scientifically.

Phytochemical tests of various parts of the dadap plant in several studies that have been conducted show that dadap contains saponins, flavonoids, polyphenols, tannins, and alkaloids. The combination of these substances is what makes the dadap plant function as an antimicrobial (Utami, 2019), antiinflammatory (Wardani et al., 2023), antipyretic (Hajaroh et al., 2023), and also antimalarial (Septiana et al., 2021).

Bioactivity and Phytochemicals Dadap (Erythrina sumbubrans)

No	Extract Type	Bioactivity	Phytochemicals	Reference
1	Ethanol extract of leaves	antiinflammatory	alkaloids, flavonoids, tannins, dan saponins	(Wardani et al., 2023)
2.	Ethyl acetate extract of root and twig	Antidiabetic and antimicrobial	Flavonoids (pterocarpan, erythrinocarpan)	(Phukhatmuen et al., 2017)
3	Ethanol extract of	Antipyretic	Flavonoids : lupalbigenin, erysubin F, abyssinone V	(Alda et al., 2024)

	roots and twigs			
4	Methanol extract of leaves	Antimicrobial	tannins, phenols, alkaloids, flavonoids, saponins, and triterpenoids	(Utami, 2019)
5	Ethanol extract of leaves	Antioxidants	Flavonoid: 5-Hydroxysophoranone, Abyssinone V, and Eribraedin B	(Dzufakar et al., 2023)

Developing the potential of *dadap* as a source of health can involve various approaches, including research on its content and benefits, development of innovative product formulations, and exploration of its potential use in medicine and nutrition. *Dadap* offers interesting potential as a source of diverse health. *Dadap*, has long been used in traditional medicine in several regions in Africa and Asia. In recent years, scientific research has provided a better understanding of the health benefits of various parts of this plant, especially in the form of extracts rich in bioactive compounds.

Various studies as in Table 1 have revealed that ethanol extract of *dadap* leaves has strong anti-inflammatory properties, which can be useful in relieving inflammation in the human body. The content of active compounds such as alkaloids, flavonoids, tannins, and saponins in this extract is believed to play a role in this effect. In addition, extracts from the roots and twigs of *dadap*, especially in the form of ethyl acetate, show potential as antidiabetic and antimicrobial agents. Specific flavonoids such as pterocarpan and erythrinocarpan are believed to play an important role in controlling blood sugar levels and fighting pathogenic microorganisms. Meanwhile, ethanol extracts from the roots and twigs were also found to have antipyretic properties, with flavonoids such as lupalbigenin, erysubin F, and abyssinone V as the main constituents. Furthermore, methanol extracts from *dadap* leaves showed strong antimicrobial activity, with tannins, phenols, alkaloids, flavonoids, saponins, and triterpenoids contributing to this effect. In addition, ethanol extracts from the leaves were also shown to have significant antioxidant properties, thanks to flavonoids such as 5-Hydroxysophoranone, Abyssinone V, and Eribraedin B. Further development of *dadap* could involve more in-depth research into the mechanisms of action of these compounds, as well as the formulation of innovative products that can be utilized in the pharmaceutical, cosmetic, and food fields to improve human health and well-being.

Flavonoids are a type of phytochemical compound found in various plants. Flavonoid compounds have various benefits for human health because they have been shown to have antioxidant, anti-inflammatory, and anticancer activities. Pterocarpan and erythrinocarpan are two classes of flavonoids that have been shown to have antimicrobial and antidiabetic activities, as well as antioxidants. They help protect body cells from damage caused by free radicals, which can lead to various degenerative diseases such as cancer, diabetes, and heart disease. Lupalbigenin, erysubin F, Abyssinone V, 5-Hydroxysophoranone, and Eribraedin B are examples of flavonoids that have shown strong antioxidant activity in studies.

In addition, flavonoids also have anti-inflammatory properties that are useful for reducing inflammation in the body. Chronic inflammation has been linked to various chronic diseases

such as arthritis, heart disease, and even cancer. Therefore, consuming foods rich in flavonoids can help reduce the risk of inflammation and related diseases. Flavonoids have also shown potential as anticancer agents. Several studies have found that flavonoids can inhibit the growth of cancer cells, stimulate apoptosis (cell death), and inhibit the process of metastasis.

Abyssinone V, a flavonoid that may inhibit certain enzymes involved in the development of Alzheimer's disease, plays a role in maintaining brain health and protecting against neurodegenerative diseases. 5-Hydroxysophoranone, another flavonoid that has been extensively studied, has demonstrated strong antioxidant and anti-inflammatory activity. Studies have also shown that this compound may help manage conditions such as diabetes by regulating blood sugar levels and improving insulin sensitivity. Eribraedin B has also been shown to have a variety of health benefits. Several studies have shown that Eribraedin B may protect the heart by reducing the risk of cardiovascular disease through its antioxidant properties. The bioactivity of flavonoids does not depend on a single compound or class of compounds, but on the combination and interaction between various compounds in food. Therefore, it is important to have a diverse diet rich in flavonoids and other phytochemicals to obtain maximum health benefits.

Overall, flavonoids, including pterocarpan and erythrinocarpan, as well as specific flavonoid compounds such as lupalbigenin, erysubin F, Abyssinone V, 5-Hydroxysophoranone, and Eribraedin B, offer a variety of important health benefits, ranging from antioxidant protection to reducing the risk of chronic diseases such as cancer, heart disease, and diabetes. By incorporating flavonoid-rich foods into our daily diets, we can support our overall health and well-being. Further development of these benefits of *dadap* could involve several approaches. First, further research into the active compounds in *dadap* and their mechanisms of action could provide a better understanding of the therapeutic potential of this plant. Second, the development of innovative product formulations, whether in the form of supplements, pharmaceuticals, or nutraceutical products, could help optimize the health benefits of *dadap*. Third, exploring the potential use of *dadap* in traditional or integrative medicine could help expand the scope of use and accommodate the needs of diverse populations. With collaboration between researchers, industry, and government, the potential of *dadap* as a health resource can be maximized to improve the welfare of society at large.

An in silico study show the potential of flavonoid compounds from Dadap Serep (Erythrina subumbrans) twigs and roots as antipyretics. This article uses the molecular docking method to predict the interaction between flavonoid compounds and Cyclooxygenase (COX) target proteins (Alda et al., 2024). In silico studies are a critical approach in drug development because they allow researchers to virtually test thousands of potential compounds, including natural products, in interactions with biological targets (Siagian et al., 2022). Eight compounds from Dadap Serep twigs and roots, namely pinocembrin, 3,6,4'-trihydroxyflavone, 3,6-dihydroxylflavone, lupalbigenin, erysubin F, genistein, 5-hydroxyphorononе, and abyssinone V. The target protein used was Cyclooxygenase (COX) with PDB code 1CX2. This in silico study shows that lupalbigenin, erysubin F, and abyssinone V from Dadap Serep (Erythrina subumbrans) twigs and roots have high potential as antipyretics (Alda et al., 2024). Antipyretics work centrally by reducing the temperature control center in the hypothalamus, followed by physiological responses including decreased heat production, increased blood flow to the skin, and increased heat release through the skin by radiation, convection, and evaporation (Dhargawe et al., 2021). Flavonoids have been shown to exhibit antipyretic activities, which

means they can help reduce fever. This effect is part of their broader anti-inflammatory and analgesic properties. Studies have demonstrated that flavonoids can inhibit the production of pro-inflammatory factors and modulate biochemical mediators involved in the inflammatory process, which can contribute to their antipyretic effects (Ysrafil et al., 2023)

CONCLUSION

Dadap (Erythrina sumbubrans) is a pivotal plant in Balinese ethnomedicine and Hindu rituals, revered as "kayu sakti" for its medicinal and spiritual significance. The plant's leaves and wood are integral in various ceremonies, such as the Pitra Yadnya and Dewa Yadnya, serving as guiding woods for the deceased and cleansing agents. Scientific studies have validated its traditional uses, revealing anti-inflammatory, antimicrobial, antipyretic, and antimalarial properties. Phytochemical analysis has identified alkaloids, flavonoids, tannins, and saponins as bioactive compounds. This research underscores the potential of *Dadap* as a valuable source of traditional medicine, contributing to the preservation of Balinese cultural heritage and the development of modern medicines. Further research into its phytochemistry can provide insights into potential dangers or side effects, promoting sustainable traditional medicine practices in Bali.

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