Zagazig J. Agric. Res., Vol. 51 No. (6) 2024 2065-2080

Plant Production Science

Available online at http://zjar.journals.ekb.eg
http:/www.journals.zu.edu.eg/journalDisplay.aspx?Journalld=1&queryType=Master

A REVIEW OF BOTANICAL FEATURE, TRADITIONAL USES AND CHEMICAL PROFILE FOR "*Dombeya wallichii*" (LINDL.) BENTH. EX BAILL

Aseel K. Alanbari[1], Wurood K. Mohamed[1], B. Boonsuk[2*] and P. Sutthisaksopon[3]

1. Biol. Dept., Edu. Coll. Pure Sci., Diyala Univ., Iraq
2. Pro. In Biol., School of Sci., Phayao 56000 Univ., Thailand
3. Fac. Environ. Cult and Ecotourism, Sriankhariivirot Univ., Bangkok10110, Thailand

Received: 05/11/2024; Accepted: 30/12/2024

ABSTRACT: *Dombeya wallichii* (Lindl.) Benth. ex Baill. is a plant that has been traditionally used in various cultures for its medicinal and therapeutic properties. The plant spreading in tropical Asia and Africa. The goal of the present review the systematic characteristics, Ethnomedicinal uses, chemical profile, and biological activities.Data of *D. wallichii* were undertaken using the analytical inductive approach based on a review of the literature and identifying what was evaluated and collected in these studies and statistics electronic databases such as EThOS, ProQuest, OATD, Google Scholar, Medline, PubMed, Science Direct, SciFinder, and SCOPUS. Literature search revealed that *D. wallichii* is used. Most studies of *D. wallichii* extracts take notes that the species have anti-inflammatory, antimicrobial, and antioxidant capacity. The study concluded that the phytochemical analysis of *Dombeya wallichii* revealed a rich chemical profile, including flavonoids, phenolic acids, alkaloids, glycosides and saponins. These compounds have been shown to have antioxidant and anti-inflammatory activities, which may contribute to the therapeutic properties of the plant. The plant was also found to contain quercetin, kaempferol, gallic acid and ursolic acid, which have been shown to have anti-inflammatory activity. Plant extracts have also been shown to have antimicrobial activity against several microorganisms, including bacteria and fungi.

Key words: *Dombeya*, botanical features, traditional uses, chemical profile, flavonoids, antimicrobial.

INTRODUCTION

Dombeya wallichii (Lindl.) Benth. ex Baill. is known as the dom-BEE-yuh wall-ICK-ee-eye, and tropical hydrangea. Is commonly known as Pink Ball tree because of its small clusters of fragrant pink flowers that hang from the branches during the fall and winter (**Gilman and Watson, 2009; Carter, 2011**). **Skema (2010)** mention that since the 1800's the species has been cultivation. Several studies based on a diverse collection of *Dombia* populations have shown distinct and unique morphological features, a different flowering period compared to homogeneous *Dombia* species, and a specific environment that merits recognition as a new species (**Le Péchon *et al*., 2013**).

Taxonomists have classified plants on the basis of their perceived evolutionary relationships, with all species in a genus being more or less closely related to each other than to species in other genera. In recent times, new taxonomic information has been accumulating more rapidly since the advent of DNA sequencing, leading to a recent wave of reclassification. Comparing DNA sequences between different species has proven to be a more effective method of determining kinship (**Borah, 2014**). As classifications receive a new understanding (**Ibrahim *et al*., 2023**), and sometimes it is necessary to change the names to represent real evolutionary relationships (**Borah, 2014**). *Dombeya wallichii* has been an interesting plant with medicinal and economic recognized value

*** Corresponding author: Tel. :**+9647816089584
E-mail address: boonchuang.bo@up.ac.th

(**Herur *et al*., 2023**). This review provides an in-depth look at the plant's characteristics, traditional uses in cultures, and chemical compounds.

Methodology

The study relied on a comprehensive literature review methodology of the existing literature on *D. wallichii*, including its botanical features, traditional uses, and chemical profile.

Taxonomy and Nomenclature

Dombeya genus was belonged to the Sterculiaceae family, but the molecular studies were moved the species to Malvaceae family (**Judd and Manchester, 1997**). *Dombeya* genus is take his name from Joseph Dombey. *wallichii* species description after Nathaniel Wallic (National parks **Board, 2016**). **Skema (2012)** mention that *Dombeya* genus including about 210 species, *Dombeya wallichii*. These species is accepted as native species in Madagascar. **Oviedo-Prieto *et al*. (2012)** reported that species as an invasive in Asia, with no specifics. According to **Gilman and Watson (2014)** the taxonomy of the spies as little invasive potential in flora of USA. Photo1. Shape of the flower of *D. wallichii.*

Synonyms and Common Names

According to **Kew Science (2023)** there are many syname take the *D. wallichii* were *Assonia wallichii* (Lindl.) Kuntze in Revis. Gen. Pl. 1: 76 (1891), *Astrapaea wallichii* Lindl. in Coll. Bot.: t. 14 (1821), *Astrapaea penduliflora* DC. In Mém. Soc. Phys. Genève 4:90 (1828), *Astrapaea speciosa* F. Dietr. in Neu. Nachtr. Vollst. Lex. Gärtn. 1: 441 (1825), *Dombeya penduliflora* (DC.) M. Gómez in Anales Soc. Esp. Hist. Nat. 19: 216 (1890), *Dombeya speciosa* (F. Dietr.) Salomon in Handb. Höheren Pflanzencultur: 347 (1880). The taxon have been occupy multi global common names were Christmas rose, dombeya, pink snowball, pink tassel dombeya, pinkball, tassel-tree, tropical hydrangea, and Hortensienbaum (German).

Description

Flora of Pakistan (2017) description the plant with following botanical characters', the plant is generally described as a small tree or shrub, the vegetative parts were begun with stem which is erect with brown color carrying medium sized green leaves, the abaxil more green from adaxil side with alternate arrangement on stem, the leaves are distinguished by cordate blade shape, including serrate margin, every leave have been reticulate venation. Flowers whorls consist calyx 5 green polypsepalous sepals linear-oblong in shape about 2 cm in length, and accompanied by 3-4 mm width, with visible densely trichomes on the adaxil side. Corolla including 4-5 synpetalous pink petals take ob-ovate shape, or sometimes oblique, with 3 longitudinal veins, diameters were 2, 1.5 cm length and width sequentially, Reproductive parts combining androecium that including 5 separate stamens with 1 - 1.5 cm long containing the anther (with medium pollen grains size) and solid filament. The gynoecium of plant has been one style divided to 5 stegma, that indicates to 5 carpels in ovate-oblong ovary. Flowers appears as an axillary Inflorescence, drooping, with width 12-15 cm almost, multi umbellate cyme. Hairy peduncle with 20 cm length and more. The fruit characterized by ovate-oblong pentagonal capsule with rusty hairs. Taxonomists always don't separate easily between *D. cayeuxii* and *D. wallichii* due this species is a cross between *D. burgessiae with D. wallichii, done* by Cyeux in 1895. While **Vélez-Gavilán (2022)** identifying the taxa by woody stem, with a smooth, grey bark. The leaves are elliptic to ovate, 5-10 cm long, with a rounded base and a acuminate apex. Flowers: The flowers are white, with five petals that are 1.5-2 cm long, and are arranged in terminal panicles. Fruit: The fruit is a capsule 2-3 cm long, with 5-7 locules, each containing several seeds. Sometimes even significant variation within individuals or populations, leading to a broader circumscription of some species. Morphological data indicate potential hybridization (**Herur *et al*., 2023**).

Distribution

D. wallichii (Malvaceae) that is native to Madagascar since the 1800's. **Skema (2014)** reports his suggesting the historical data via Mauritius and India it came to Europe (**Skema, 2010**). **Anonymous (1919)** recorded species as an ornamental was obtainable in America in 1919, While **New York Botanical Garden (2017)** registered it as cultivated species in Caribbean in 1885. Central Madagascar at least one of the origins of *D. wallichii* that suggested

Pic 1. Shape of the flower of *D. wallichii* according to https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:823281-1/images

by **Skema (2010)** molecular data, rare native separation is poor and understood till now, addition the collected specimens have no associated location data with them (**Skema, 2014**). The data are scarce about the distribution and spread species where it is reported as introduced in North America, Central America, **Asia *et al.* (2021)** studied the Emeries' cultivate, *D. wallichii*. In Iraq has been in known as a strange and uncommon plant, but it has been successfully cultivated in middle and south regions (**Ibrahim *et al.*, 2023**).

Some *Dombeya* species are endemic to specific islands or regions, while others have been introduced to regions with an activity. Understanding the geographical distribution of *Dombeya* species is essential for identify areas of high taxa diversity and potential regions for introduction (**Paris, 2021**).

The geographical distribution of *Dombeya* species can be broadly categorized into many regions: (**Paris, 2021**) Africa: Eastern, western, and central regions, including countries such as South Africa, Mozambique, Tanzania, Kenya, and Madagascar. Asia: Tropical regions of India, Sri Lanka, and Southeast Asia, including countries such as Indonesia, Malaysia, and the Philippines. Pacific Islands: Islands in the western Pacific, including Hawaii, Fiji, and the Solomon Islands. Indian Ocean: Islands in the western Indian Ocean, including Mauritius, Réunion, and the Seychelles. The distribution table for details, **Randall (2007), Acevedo-Rodriguez and Strong (2012), Natinal parks board (2016), Dav's garden (2017), E-Flora of India (2017) and Missouri Botnical Garden (2017)**. The distribution in the summary table is based on all the data available to **CABI (2020)**.

Ethnomedicinal or Traditional Uses

D. wallichii is a medicinal plant used as a potential source of drugs and perfumes. More than a side of the drugs used globaly including natural compounds derived from plants, which are often used as key molecules whose activities can be enhanced by manipulating them through chemical synthesis and synthetic chemistry that can be exploited in the field of research and development of new drugs (**Kumar and Nisha, 2021**). In the past, some taxa of *Dombia* were used as a herbal medicines in tropical areas of Africa, the leaves were used as a treat malaria after boiled, in other hand, the roots boiling to make medicine to treat stomach pain, in Chile and Pero used as natural recipe for diabetes (**Maroyi, 2018**), moreover a range of diseases were treated like blood pressure, dry mouth, ear infections, gastric troubles, and skin conditions. Additionally, *D. wallichii* has cultural significance, as it is used in traditional celebrating rituals. Overall, *Dombeya wallichii* is a versatile plant with a range of traditional uses (**Ambu *et al*., 2020**).

Table 1. Distribution of *D. wallichii.* based on all the information available to CABI (2020)

Region	Distribution	Origin	Reference
Madagascar	Present	Native	USDA-ARS (2017)
India	Present	Introduced	E-Flora of India (2017)
- Maharashtra	Present	Introduced	Krishnan, et al (2017)
Pakistan	Present, Only in captivity	Introduced	Flora of Pakistan (2017)
Philippines	Present, Only incaptivity/ cultivation	Introduced	Ruales, and Jumawan, (2023).
Singapore	Present, Only incaptivity/ cultivation	Introduced	CABI (2020)
Thailand	Present	Introduced	CABI(2020)
Italy	Present, Only in captivity/ cultivation	Introduced	CABI(2020)
Switzerland	Present, Only in captivity/ cultivation	Introduced	Anonymous (1896)
United Kingdom	Present, Only in captivity/ cultivation	Introduced	Anonymous (1896)
Costa Rica	Present	Introduced	Missouri Botanical Garden (2017)
Cuba	Present	Introduced	Oviedo Prieto et al. (2012)
Dominican	Present	Introduced	Acevedo-Rodríguez and Strong (2012)
Honduras	Present	Introduced	Missouri Botanical Garden (2017)
Mexico	Present	Introduced	Missouri Botanical Garden (2017)
United States	Present	Introduced	Missouri Botanical Garden (2017)
Australia	Present, Only in captivity/cultivation	Introduced	Randall (2007)
Brazil	Present, Only in captivity/cultivation	Introduced	CABI (2020)
- Minas Gerais	Present, Only in captivity/cultivation	Introduced	CABI(2020)
Venezuela	Present, Only in captivity/cultivation	Introduced	CABI(2020)

The roots were also made into a stimulant and used as an enema for indigestion and severe stomach pain, while in Tanzania it was commonly used to treat abdominal pain and intestinal colic. In the city of Zaranbia, the leaves were rubbed on abscesses as a counter-irritant (**Reid *et al.*, 2001**).

In addition to its medicinal, cultural, and industrial uses, *D. wallichii* has also been used in traditional practices for its food and environmental benefits. The plant's leaves and flowers are edible and can be consumed as a vegetable or used as a flavoring agent in local cuisine. Furthermore, *D. wallichii* has been used in traditional agriculture as a shade tree, providing shelter for other crops and helping to maintain soil quality (**Reid *et al*., 2001**).

In some communities, the plant is also used in traditional rituals and ceremonies to promote spiritual growth and well-being. The plant's unique properties and versatility have made it an integral part of traditional practices in various regions (**Herur *et al*., 2023**).

It's worth noting that while *D. wallichii* has been used in traditional practices for centuries, its effectiveness and safety for certain uses have not been extensively scientifically studied. As with any traditional remedy, it's essential to consult with a healthcare professional before using the plant for medicinal purposes (**Herur *et al*., 2023**).

Bioactive compounds

The chemical compounds in this plant are one of the broad classes of biologically active compounds found in plants. Phytochemicals are chemical compounds produced by plants as part of their normal metabolic processes, and they may have a wide range of biological activities and antioxidant effects (**Aldrwesh and Alanbari, 2021**).

Nevertheless, many biological secondary metabolites of plant origin are known, work is still underway to identify all the activities that the phytochemical compound can perform (**Sakhale *et al*., 2023**). These substances have been shown to improve the inflammatory response by exerting antioxidant activity. (**Bouyahya *et al*, 2022; Otero *et al*., 2023; Speisky, 2022**). Improved lipid metabolism control (**Chao *et al*., 2009**), effect on glucose levels (**Birková *et al*., 2020**) some of them conjugated side chain working as producing DNA and lipid from oxidation **Raj *et al*. (2022) and Kim *et al.* (2012)** reported the bioactive compounds normalization calcium homeostasis. even more the phytochemical compounds act as human neuroblastoma cell production (**Tian *et al*., 2019; Cai *et al*., 2023**). Generally the bioactive compounds works as a pharmaceutical substance in human metabolism (**Wang *et al*., 2023; Jiang *et al*., 2023**).

Poly phenols can interfere in biochemical processes, that overlapping with carcinogenesis (**Han *et al*., 2007**) effects of anticancer have been showed in the colon, duodenum, liver, lung, mouth, skin, and stomach (**Li *et al*., 2014**). For data multi various polyphenolic compounds have been examined and shown protective impact in specific models, while the technique of action varies (**Johnson *et al*., 1994**). The data of in vitro experiences showed inhibition of cellular proliferation and viability with apoptosis of 4T1 cancer cells (**Mantena, 2005**) and stimulate tumor cell to death (**Landis-Piwowar *et al*., 2007**). Gallic acid preventing colon carcinogenesis and inhibits damage of DNA, with increases the antioxidant level compare with ascorbic acid (**Giftson *et al*., 2010**) the structure of flavones works on reduce the proliferation of HT-29 cancer cells and induces apoptosis activities (**Wenzel *et al*., 2000**). Proved Curcumin inhibits cellular angiogenesis in vitro and in vivo experiments (**Kunnumakkara *et al*. 2007**) also resveratrol blocks activiation of the AP-1, and MAPKs on rats skin (**Kundu *et al*., 2004**). The investigating of antimicrobial activity of polyphenols reinforced against bacteria, fungi, and viruses (**Li *et al*., 2014**) they have been many mechanisms appear such as covalent bonds, forming hydrogen bonds, and hydrophobic effects outcome from microbial adhesins, cell envelope transport protein, enzymes, biofilm formation inhibition, bacterial toxin, synergistic effect with antibiotics,, protect aginst pests and for UV protect, and more other (**Eumkeb *et al*., 2010; Daglia, 2012; Kumar and Pandey, 2013; Espíndola *et al*., 2016**). The DNA gyrase in *E. coli* was inhibited by apigenin and quercetin compounds (**Ohemeng *et al*., 1993**), while naringenin effects on liquidity layers of inner and outer plasma membrane (**Tsuchiya and Iinuma, 2000; Semaming *et al*., 2015**). **Mori *et***

***al.* (1987)** studied activity –structure relationship of hydroxyl group for antimicrobial activity. Moreover it have been act important in protecting the functions of immune cells, anti-diabetic effects, anti-allergic activity, and hormonal modification (**Stojkovi´c *et al.*, 2013; Li *et al.*, 2014**). Vanillic acid one of the total phenols compound it has anti-carcinogenic, anti-microbial, and antioxidant properties, one of these according to 113 the vanillic acid has ability to damage the DNAof lung and colon cancer cells. Even more it can inhibitor the protein expression of necrosis facter *a*(TNF-*a*) and play as a anti-inflammatory facter (**Yu *et al.*, 2019**), by reducing the ATP concentration and pH in mamberane of microbial cells. Gallic acid play important role in antioxidant activity, anti-cancer (**Li *et al.*, 2017; Pal *et al.*, 2018; Kahkeshani *et al.*, 2019; Yu *et al.*, 2019; Al Zahrani *et al.*, 2020**) anti UV, anti-inflammatory (**Noreen *et al.*, 2017**), antifungal, and anti-microbial properties (**Lu *et al.*, 2006; Kratz *et al.*, 2008; Couto *et al.*, 2013; Badhani *et al.*, 2015; Sorrentino *et al.*, 2017; Akbari *et al.*, 2020; Jiang *et al.*, 2022**). The gallic acid occurs in plant as a hydro sable tannins (**Kaliora *et al.*, 2013**). Currently, Due to its benefits to humans, methods of isolating and producing it have been developed (**Wianowska *et al.*, 2023**). Many studies were determinated the gallic acid anti-oxidant activity such as **Dawidowicz *et al.* (2015), Sunitha (2016), Phonsatta *et al.* (2017), Olszowy *et al.* (2019), Olszowy (2019); Rafiee *et al.* (2019), Wang *et al.* (2019) and Khorsandi *et al.*(2020)**.

Ability to damage the cancer cells were improved by callic acid (**Sudheer *et al.*, 2007; Sun *et al.*, 2015; Wang *et al.*, 2016; Damasceno *et al.*, 2017; Zhang *et al.*, 2019; Zheng *et al.*, 2024**).

The *Dombeya* plant consists of a number of biologically active compounds, including (flavonoids, phenolic acids, and terpenoids). The properties of these compounds are that they are antioxidants, anti-inflammatory, and antimicrobial, which is why they were widely used in the past (**Kudumela and Masoko, 2018**).

The extracts also contain chemical components including (carbohydrates, coumarins, flavonoids, terpenoids, and alkaloids), and these components are known as secondary metabolites responsible for the therapeutic effects (**Kumar and Nisha, 2021**).

Through the first qualitative phytochemical analyses and tests, the primary compounds were found, namely (alkaloids, carbohydrates, coumarins, terpenoids, and flavonoids) present in the ethanolic extract of the *Dombya* plant (**Kumar and Nisha, 2021**). The presence of these secondary receptors subjected to ethanolic extracts for color reactions of chemical tests was also confirmed. Flavonoids are the largest plant class known to have antioxidant activities, both in the laboratory and in the living body, as reports indicated that they maintain the function of beta cells by reducing tissue damage resulting from oxidative stress (**Kumar and Nisha, 2021**).

Phytochemical analysis of *D. wallichii* has been performed using various techniques, including gas chromatography-mass spectrometry (GC-MS) and high-performance liquid chromatography (HPLC). These studies have identified a range of phytochemical compounds, including flavonoids, phenolic acids, and terpenoids. Table 2 mention the bioactive compounds in plant.

The above table shows that cardiac glycosides, fatty acids, flavonoids, phenols, saponins, iridoids, tannins, and terpenoids from the leaves of the plant. Using vacuum liquid chromatography and preparative thin layer chromatography, a wide range of The aqueous acetone leaf extracts of *Dombeya* species have been found to exhibit a broad spectrum of pharmacological activities, including the ability to combat parasitic worms, lower blood pressure, inhibit acetylcholinesterase, reduce inflammation, fight against microorganisms, and neutralize free radicals. Gallic acid, flavonoids Kaempferol, Quercetin, and Ursolic acid were isolated from *D. wallichii*.

Anti-aging activity

D. wallichii reported as a inhibiter of anti-aging activity (**Herur *et al.*, 2023**) but the effect and the mechanics of plant woek are not yet fully understood. it is believed that the plant's antioxidant properties play a significant role. Antioxidants help to neutralize free radicals, which can cause oxidative stress and contribute to the aging process. By reducing oxidative stress, *D. wallichii* may help to promote healthier, more youthful-looking skin. Additionally, the plant's antioxidant properties may also help to protect against age-related diseases, such as wrinkles and age spots (**Herur *et al.*, 2023**).

Table 2. Phytochemical compound in *Dombeya* (Maroyi, 2018)

Phytochemical composition	Values	Plant parts
Condensed tannin (%)	6.2	Leaves
Crude protein (%)	14.7	Leaves
Flavonoid [mg of quercetin equivalent (QE)/g]	19.90–35.4	Leaves
Iridoids (µg harpagoside equivalent/g of dry weight)	7076.6–9499.6	Leaves
Neutral detergent fiber (%)	45.3	Leaves
Total phenolics [mg of gallic acid equivalent (GAE)/g]	45.3–259.0	Leaves
Tannin [mg of gallic acid equivalent (GAE)/g]	330.33 ± 15.63	Leaves

The plant extracts have been shown to have antimicrobial properties, which can help prevent the growth of certain microorganisms. Additionally, the plant's antioxidant properties may help protect against cell damage and reduce the risk of certain diseases. The plant's cytotoxic activity has also been studied, and it has been found to have potential as an anticancer agent (**Vélez-Gavilán, 2022**). **Herur *et al*. (2023)** revealed the substances found in *Dombeya* and Lychee that have been found to exhibit anti-aging activity. A series of anti-aging components such as (flavonoids) which can help promote healthier and reduce oxidative stress, more younger looking skin (**Borah, 2014**).

Antibacterial activity

Ambu *et al*. (2020) study examined the extract of four parts from *Dombia* plant, were bark, flowers, leaves, and stem to determine its antibacterial activity against the five bacterial strains used through agar well diffusion in MHA. Through the experiment, the study discovered that the microbial activity of the plant extract has a positive control (gentamicin 10 µg/ml), or a negative control/solvent (10% DMSO) and in its light it was not allowed to diffuse. **Herur *et al*. (2023)** testing the plant extracts and determining their antibacterial activity based on the disk diffusion test, the activity was tested against six bacterial strains of *E. coli, Bacillus sublilis, Staphylococcus aureus, Staphylococcus epidermidis, Klebsiella pneumoniae*... etc. The antibacterial activity was expressed as a percentage of the inhibition zone that produces the plant extract, outcome of the study cleared that parts plant extracts, had varying rang of efficacy bacteria growth inhibiting. The maximum growth inhibition zone for the water plant extracts of bark, leaf, and stem (**Altemimi *et al*., 2016**). The various phytochemicals can be differences aqueous and alcoholic extracts according to dissolve materiel (**Mariana *et al*., 2013**). Ethanol can extract more carotenoids, and aqueous method can extract more polyphenols (**Mariana *et al*., 2013**). This data available in Figs. 1 and 2 even more extraction process of bioactive compounds is based on the applied technique and organic solvent (**Ranjha *et al*., 2021**). Polarity of water may be the cause of provide much larger yields than alcoholic extracts from the same plants (**Caleja *et al*., 2016; Dhanani, 2017**).

Anti- cancer activity

D. wallichii showed exhibited strong anticancer activity on lung cancer (A549) cell line. **Kumar *et al.* (2021)** results laying the foundation stone for the further examination and determination of medicinal compounds of anticancer property, it was clear that the ethanolic leaf extract of *D. wallichii* showed potential anticancer activity and the possibilities for the herbal treatment of these diseases and this study could be continued to explore therapeutic activities other than cytotoxicity and antioxidant activity in leaves as well as other parts of the plant.

Anti-inflammatory active

The anti-inflammatory active substances in the plant *D. wallichii* there are not founding but researchers have investigated the anti-inflammatory properties of *D. rotundifolia* extracts using different methods. The study found that leaf and shoot extracts showed significant anti-inflammatory activity, with inhibition rates ranging from 55% to 97%. Another study used a different method to evaluate the anti-inflammatory potential of

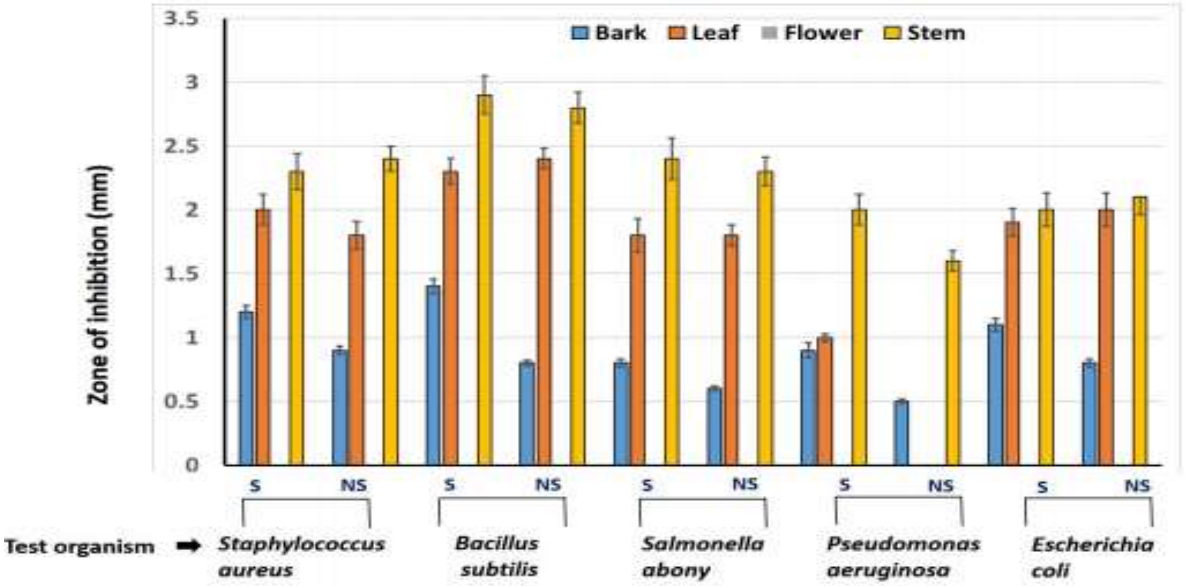

Fig. 1. Zone of inhibition (ZOI) measurements for the water extracts (Herur *et al*., 2023)

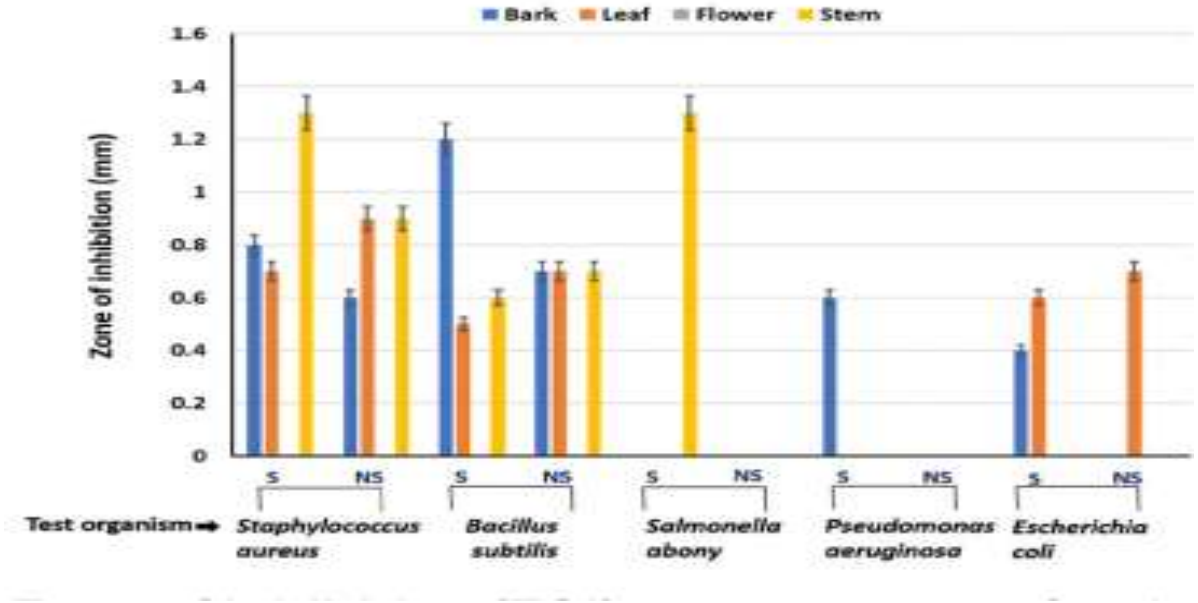

Fig. 1. Zone of inhibition (ZOI) measurements for the acetone extracts (Herur *et al*., 2023)

Table 2. Kumar and Nisha (2021)

	Concetation µg.ml				
	200	**400**	**600**	**800**	**1000**
Eth. *D. wallichii*	8.1	18.7	34.7	57.7	71.8
Ascorbic acid	19.3	39.2	57.4	80	90

acetone leaf extracts and found that they inhibited the production of reactive oxygen species in a dose-dependent manner, even outperforming curcumin at high concentrations. These findings support the traditional use of Dombeya in treating various inflammatory conditions, such as abdominal pain, abscesses, hemorrhoids, intestinal ulcers, and wounds in several African countries (**Maroyi, 2018**).

Antioxidant activity

Kumar and Nisha (2021) study have shown that extracts of *D. wallichii* with DPPH test is a reliable method for measuring antioxidant activity by assessing the ability of a substance to neutralize free radicals. All data in Table 2 the highest antioxidant activity was observed at 71.8% at a concentration of 1000 µg/ml, with activity increasing with concentration. The extract of *D. wallichii* showed notable antioxidant activity. Antioxidants play a crucial role in protecting the body from diseases by combating free radicals. While synthetic drugs can provide antioxidant effects, they often have adverse side effects (**Suwalsky and Avello, 2014**). In contrast, plant-derived antioxidants, such as ascorbic acid, carotenoids, and phenolic compounds (**Lupea *et al.*, 2008**) can provide a safer alternative working by either preventing the production of free radicals or neutralizing them (**Kumar and Nisha, 2021**).

REFERENCES

Acevedo-Rodríguez, P., M.T. Strong (2012). Catalogue of the Seed Plants of the West Indies. Washington, DC, USA: Smithsonian Institution. 1192 http://botany.si.edu/ Antilles /WestIndies/catalog.htm.

Akbari, G., M. Dianat and M. Badavi (2020). Effect of gallic acid on electrophysiological properties and ventricular arrhythmia following chemical-induced arrhythmia in rat.Iran. J. Basic Med. Sci., 23:167–172. doi: 10.22038/IJBMS.2019.33296.7948. [PM C free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]

Al-Zahrani, N.A., R.M. El-Shishtawy and A.M. Asiri (2020). Recent developments of gallic acid derivatives and their hybrids in medicinal chemistry: A review. Eur. J. Med. Chem., 204:112609. doi: 10.1016/j.ejmech. 2020. 112609. [PubMed] [CrossRef] [Google Scholar] [Ref list]

Aldrwesh, F.R. and A.K. Alanbari (2021). Profile of phenols, tannins and antioxidant activity of some medicinal plants by using HPLC. Biochem. Cell. Arch., 21: 12197-2202. https://connectjournals.com/03896. 2021.21.2197.

Altemimi, A. (2016). Ultrasound Assisted Extraction of Phenolic Compounds from Peaches and Pumpkins. Plos One, vol. 11, no. 2, 17 Feb.e0148758. https://doi.org/10. 1371/journal.pone.0148758.

Ambu, G., R.P. Chaudhary, M. Mariotti and L. Cornara (2020). Traditional Uses of Medicinal Plants by Ethnic People in the Kavrepalanchok District, Central Nepal. Plants, 9 (6): 759. https://doi.org/10.3390/ plants9060759

Anonymous (1919). The Everglades Nursery Company [catalog]: growers of palms, crotons, hibiscus, vines, budded avocado pears: inarched Indian mangoes, etc., https:// biodiversitylibrary.org/page/50541785.

Badhani, B., N. Sharma and R. Kakkar (2015). Gallic acid: A versatile antioxidant with promising therapeutic and industrial applications. RSC Adv.,5 : 27540–27557. doi: 10.1039/C5RA01911G. [CrossRef] [Go ogle Scholar] [Ref list]

Birková, A., B.B. Hubková, M. Mareková, B. Cižmárová (2020). Caffeic acid: A brief overview of its presence, metabolism, and bioactivity. Bioact. Compd. Health Dis., 3: 74.

Borah, R. (2014). An updated account of the name changes of the dicotyledonous plant species included in the Vol: I (1934- 36) and VOL: II (1938) OF "FLORA OF ASSAM." 89: 14 (1): 87–96. Retrieved from https:// www.vliz.be/imisdocs/publications/308783.

Bouyahya, A., N.E. Omari, N. El Hachlafi, M.E. Jemly, M. Hakkour and A. Balahbib, A. (2022). Chemical compounds of berry-derived polyphenols and their effects on gut microbiota, inflammation, and cancer. Molec., 27: 3286. doi: 10.3390/molecules 27

103286PubMed.Abstract | Cross Ref. Full Text| Google Scholar

CABI (2020). Undated. Compendium record. Wallingford, UK: CABI

Cai, T. and B. Cai (2023). Pharmacological activities of esculin and esculetin: A Review. Med., 102: e35306.

Caleja, C., L. Barros, A.L. Antonio, M. Carocho, M.B.P.P. Oliveira and I.C.F.R. Ferreira (2016). Fortification of yogurts with different antioxidant preservatives: a comparative study between natural and synthetic additives. Food Chem., 210: 262-268.

Carter, K. (2011). Center for Landscape and Urban Horticulture Tropical Hydrangea Dombeya wallichii. Retrieved from https://ucanr.edu/sites/UrbanHort/files/80193.pdf

Chao, P., C. Hsu, M. Yin (2009). Anti-inflammatory and anti-coagulatory activities of caffeic acid and ellagic acid in cardiac tissue of diabetic mice. Nutr. Metab., 6: 33.

Couto, A.G., C.A. Kassuya, J.B. Calixto, P. Petrovick (2013). Anti-inflammatory, antiallodynic effects and quantitative analysis of gallic acid in spray dried powders from *Phyllanthus niruri* leaves, stems, roots and whole plant. Braz. J. Pharm., 23:124-131. doi:10.1590/S0102-695X2013000100017.

Daglia, M. (2012). Polyphenols as antimicrobial agents. Curr. Opin. Biotechnol., 23:174-181.

Damasceno, S.S., B.B. Dantas, J. Ribeiro-Filho, D.A.M. Araújo and J.G.M. da Costa (2017). Chemical Properties of Caffeic and Ferulic Acidsin Biological System: Implications in Cancer Therapy. A Review. Curr. Pharm. Des., 23: 3015–3023.

Dave's Garden (2016). Dave's Garden. http://davesgarden.com/.

Dawidowicz, A.L., M. Olszowy and M. Jóźwik-Dolęba (2015). Importance of solvent association in the estimation of antioxidant properties of phenolic compounds by DPPH method. J. Food Sci. Technol., 52: 4523–4529.doi: 10.1007/s13197-014-1451-2.

Dhanani, T., S. Shah, N.A. Gajbhiye and S. Kumar (2017). Effect of extraction methods on yield, phytochemical constituents and antioxidant activity of Withania Somnifera Arab. J. Chem., 10 (2): 1193-1199.

E-Flora of India (2017). Eflora of India. A---L (families and genera)., https://sites.google.com/site/efloraofindia/species/a---l

Espíndola, K.M.M., R.G. Ferreira, L.E.M. Narvaez, A.C.R. Silva Rosario, A.H.M. da Silva, A.G.B. Silva, A.P.O. Vieira and M.C. Monteiro (2019). Chemical and Pharmacological Aspects of Caffeic Acid and Its Activity in Hepatocarcinoma. Front. Oncol., 9: 541.

Eumkeb, G., S. Sakdarat, S. Siriwong (2010). Reversing β-lactam antibiotic resistance of Staphylococcus aureus with galangin from Alpiniaofficinarum Hance and synergism with ceftazidime. Phytomedicine, 18:40–45.

Flora of Pakistan (2017). Flora of Pakistan/ Pakistan Plant Database (PPD). Tropicos website. In: Flora of Pakistan/Pakistan Plant Database (PPD). Tropicos website. St. Louis, Missouri and Cambridge, Massachusetts, USA: Missouri Botanical Garden and Harvard University Herbaria. http://www.tropicos.org/Project/Pakistan.

Franciškovi´c, M., R. Gonzalez-Pérez, D. Orˇci´c, F. Sánchez de Medina, O. Martínez-Augustin, E. Svirˇcev, N. Simin and N. MimicaDuki´c (2017). Chemical Composition and Immuno-Modulatory Effects of *Urtica dioica* L. (Stinging Nettle) Extracts. Phyther. Res., 31 :1191–1183 .

Giftson, J.S., S. Jayanthi and N. Nalini (2010). Chemopreventive efficacy of gallic acid, an antioxidant and anticarcinogenic polyphenol, against 1,2-dimethyl hydrazine induced rat colon carcinogenesis. Investig. New Drugs, 28, 251–259.

Gilman, E.F. and D.G. Watson (2009). Florida; http://edis.ifas.ufl.edu/ST232 link checked April 24, 2009.

Han, X., T. Shen and H. Lou (2007). Dietary Polyphenols and Their Biological Significance. Int. J. Mol. Sci., 8: 950.

Herur, S., S. Kashyap, S. Vashisht, D. Shankara, P. Shree and V.K. Bayineni (2023). Antibacterial activity by *Dombeya wallichii* plant extracts obtained by ultrasound-assisted extraction. Emerging Investigators, 6 (11): 1-8. https://doi.org/10.59720/22-260.

Ibrahim, Z.M., S.A. Hassan, E.A. Karakish and I.M. Ismail (2022). Significance ofeed storage protein and seed morphological characters in the classification of some species of Malvaceaes. l. Egypt. J. Bot., 36 (2):431-455.

Jiang, Y., J. Pei, Y. Zheng, Y.J. Miao, B.Z. Duan and L.F. Huang (2022). Gallic Acid: A Potential Anti-Cancer Agent. Chin. J. Integr. Med., 28: 661–671. doi: 10.1007/s11655-021- 3345-2.

Jiang, H., M. Zhang, X. Lin, X. Zheng, H. Qi, J. Chen, X. Zeng, W. Bai and G. Xiao (2023). Biological Activities and Solubilization Methodologies of Naringin. Foods, 12: 2327.

Kahkeshani, N., F. Farzaei, M. Fotouhi, S.S. Alavi, R. Bahramsoltani, R. Naseri, S. Momtaz, Z. Abbasabadi, R. Rahimi and M.H. Farzaei (2019). Pharmacological effects of gallic acid in health and diseases: A mechanistic review. Iran. J. Basic Med. Sci., 22: 225–237. doi: 10.22038/ IJBMS. 2019. 32806.7897.

Kaliora, A.C., P.T. Kanellos and N. Kalogeropoulos (2013). Gallic Acid Bioavailability in Humans, Chapter 15. In: Thompson M.A., Collins P.B., editors. Handbook on Gallic Acid. Nova Science Publishers, Inc.; Hauppauge, NY, USA: 301–312.

Khorsandi, K., Kianmehr Z., Hosseinmardi Z., Hosseinzadeh R. Anti-cancer effect of gallic acid in presence of low level laser irradiation: ROS production and induction of apoptosis and ferroptosis. Cancer Cell Int. 2020;20:18. doi: 10.1186/s12935-020-1100-y

Kim, S.; Bolton, E.E.; Bryant, S.H. 2012. Effects of multiple conformers per compound upon 3-D similarity search and bioassay data analysis. J. Cheminform. 4, 28. [CrossRef] [PubMed[

Kratz J.M., Andrighetti-Fröhner C.R., Kolling D.J., Leal P.C., Cirne-Santos C.C., Yunes R.A., Nunes R.J., Trybala E., Bergström T., Frugulhetti I.C.P.P., 2008. Anti-HSV-1 and anti-HIV-1 activity of gallic acid and pentyl gallate. *Memórias Inst. Oswaldo Cruz.* 2008;103:437–442. doi: 10.1590/S0074-02762008000500005. [PubMed] [CrossRef] [Google Scholar] [Ref list]

Krishnan, P., Deepak Samuel, V., Sreeraj, C. R., Abhilash, K. R., Patro, S., Sankar, R., ... & Ramesh, R. (2017). Digital repositories for coastal wetland biodiversity in South Asia: a conceptual framework from India. *Wetland Science: Perspectives From South Asia*, 51-65.

Kudumela, R. G., and Masoko, P. (2018). In Vitro Assessment of Selected Medicinal Plants Used by the Bapedi Community in South Africa for Treatment of Bacterial Infections. *Journal of Evidence-Based Integrative Medicine*, *23*(88), 2515690X1876273. https://doi.org/10.1177/2515690x18762736.

Kumar U, D., L, N., and Nisha P, D. (2021). Antioxidant Activity and In-vitro Cytotoxicity Study of Novel Dombeya wallichii (An invasive plant) against Human Lung Cancer Cell Line. Int. J. Pharm. Sci. Rev. and Res., 69 (2): https://doi.org/10.47583/ijpsrr.2021.v69i02.015

Kumar, S.; Pandey, A.K. (2013). Chemistry and Biological Activities of Flavonoids: An Overview. Sci. World J. 2013, , 162750 .]CrossRef[

Kundu, J.K.; Chun, K.; Kim, S.O.; Surh, Y. Resveratrol inhibits phorbol ester-induced cyclooxygenase-2 expression in mouse skin: MAPKs and AP-1 as potential molecular targets. BioFactors 2004, 21, 33–39. [CrossRef[

Kunnumakkara, A.B.; Guha, S.; Krishnan, S.; Diagaradjane, P.; Gelovani, J.; Aggarwal, B.B. Curcumin Potentiates Antitumor Activity of Gemcitabine in an Orthotopic Model of Pancreatic Cancer through Suppression of Proliferation, Angiogenesis, and Inhibition of Nuclear Factor-κB–

Regulated Gene Products. Cancer Res. 2007, 67, 3853–3861. [CrossRef[

Landis-Piwowar, K.R.; Huo, C.; Chen, D.; Milacic, V.; Shi, G.; Chan, T.H.; Dou, Q.P. A 2007. Novel Prodrug of the Green Tea Polyphenol- Epigallocatechin-3-Gallate as a Potential Anticancer Agent. Cancer Res., 67, 4303–4310. [CrossRef] [PubMed[

Li Z.-J., Liu M., Dawuti G., Dou Q., Ma Y., Liu H.-G., 2017.Aibai S. Antifungal Activity of Gallic Acid In Vitro and In Vivo. *Phytother. Res.* ;39:1039–1045. doi: 10.1002/ptr.5823. [PubMed] [CrossRef] [Google Scholar] [Ref list]

Li, A.-N.; Li, S.; Zhang, Y.-J.; Xu, X.-R.; Chen, Y.-M.; Li, H.-B. 2014.Resources and Biological Activities of Natural Polyphenols. Nutrient6; 6020-6047.

Lu Z., Nie G., Belton P.S., Tang H., Zhao B. 2005.Structure–activity relationship analysis of antioxidant ability and neuroprotective effect of gallic acid derivatives. Neurochem. Int;46:263–274. doi: 10.1016

Lupea AX, Pop M, Cacig S. 2008. Structure-radical scavenging activity relationships of flavonoids from Zziphus and Hdrangea extracts. Rev Chim.;59(3):309–13.

Mantena, S.K. Grape seed proanthocyanidins induce apoptosis and inhibit metastasis of highly metastatic breast carcinoma cells.Carcinogenesis 2005, 27, 1682–1691. [CrossRef] [PubMed[

Mariana, M., et al. 2013. "Study of alcoholic and aqueous extraction of pequi (Caryocar brasiliense Camb.) natural antioxidants and extracts concentration by nanofiltration " Journal of Food Engineering, Vol. 117, no. 4: 427-450. https://doi.org/10.1016/j.jfoodeng.2012.12.007

Maroyi, A. 2018. Dombeya rotundifolia (Hochst.) Planch.: review of its botany, medicinal uses, phytochemistry and biological activities. *Journal of Complementary Medicine Research*, *9*(3), 74. https://doi.org/10.5455/jcmr.20181001042544

Meeteren van, M.E.; Hendriks, J.J.; Dijkstra, C.D.; van Tol, E.A. Dietary compounds prevent oxidative damage and nitric oxide production by cells involved in demyelinating disease. Biochem. Pharmacol. 2004, 67, 967–975. [CrossRef] [PubMed[

Missouri Botanical Garden, 2017. Tropicos database., St. Louis, Missouri, USA: Missouri Botanical Garden. http://www.tropicos.org/

Mori, A.; Nishino, C.; Enoki, N.; Tawata, S. Antibacterial activity and mode of action of plant flavonoids against Proteus vulgaris and Staphylococcus aureus. Phytochemistry 1987, 26, 2231–2234. [CrossRef[

National Parks Board, 2016. Flora and fauna web. Singapore: National Parks Board (online). http://florafaunaweb.nparks.gov.sg/Home.aspx

Nayeem N., Smb A. Gallic Acid: A Promising Lead Molecule for Drug Development. J. Appl. Pharm. 2016;8:2. doi: 10.4172/1920-4159.1000213. [CrossRef] [Google Scholar]

New York Botanical Garden, 2017. The C.V. Starr Virtual Herbarium. New York, USA: The New York Botanical Garden. http://sweetgum.nybg.org/science/vh/

Noreen H., Semmar N., Farman M., McCullagh J.S. 2017. Measurement of total phenolic content and antioxidant activity of aerial parts of medicinal plant Coronopus didymus. Asian Pac. J. Trop. Med. ;10:792–801. doi: 10.1016/j.apjtm.2017.07.024.

Ohemeng, K.A.; Schwender, C.F.; Fu, K.P.; Barrett, J.F. DNA gyrase inhibitory and antibacterial activity of some flavones(1.(Bioorg. Med. Chem. Lett. 1993, 3, 225–230.

Olszowy M. 2019. What is responsible for antioxidant properties of polyphenolic compounds from plants? *Plant Physiol. Biochem.* ;144:135–143. doi: 10.1016/j.plaphy.2019.09.039. [PubMed] [CrossRef] [Google Scholar] [Ref list]

Olszowy M., Dawidowicz A.L., Jóźwik-Dolęba M. 2019. Are mutual interactions between antioxidants the only factors responsible for antagonistic antioxidant effect of their mixtures? Additive and antagonistic antioxidant effects in mixtures of gallic, ferulic and caffeic acids. *Eur. Food Res. Technol.* ;245:1473–1485. doi: 10.1007/s00217-019-03255-7. [CrossRef] [Google Scholar] [Ref list]

Otero, C., Klagges, C., Morales, B., Sotomayor, P., Escobar, J., Fuentes, J. A. 2023. Anti-inflammatory Chilean endemic. Plants. Pharmaceutics 15, 897. doi: 10.3390/pharmaceutics15030897

Oviedo Prieto R, Herrera Oliver P, Caluff MG, 2011.National list of invasive and potentially invasive plants in the Republic of Cuba - (Lista nacional de especies de plantas invasoras y potencialmente invasoras en la República de Cuba - 2011). Bissea: Boletín sobre Conservación de Plantas del Jardín Botánico Nacional de Cuba, 6(Special Issue 1):22-96.

Pal S.M., Avneet G., Siddhraj S.S. 2018. Gallic acid: Pharmacological promising lead molecule: A review. *Int. J. Pharmacogn. Phytochem. Res.* 10:132–138. doi: 10.25258/phyto.10.4.2. [CrossRef] [Google Scholar] [Ref list]

Paris, Linn. 2021. Dombeya wallichii (Lindl.) Benth. ex Baill. | Plants of the World Online | Kew Science. Retrieved September 8, 2024, from Plants of the World Online website: https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:823281-1

phenolic compounds from extra virgin olive oil identified in human whole blood

Phonsatta N., Deetae P., Luangpituksa P., Grajeda-Iglesias C., Figueroa-Espinoza M.C., Le Comte J., Villeneuve P., Decker E.A., Visessanguan W., Panya A. Comparison of Antioxidant Evaluation Assays for Investigating Antioxidative Activity of Gallic Acid and Its Alkyl Esters in Different Food Matrices. J. Agric. Food Chem. 2017;65:7509–7518. doi: 10.1021/acs.jafc.7b02503.

Rafiee S.A., Farhoosh R., Sharif A. 2019. Antioxidant Activity of Gallic Acid as Affected by an Extra Carboxyl Group than Pyrogallol in Various Oxidative Environments. *Eur. J. Lipid Sci. Technol.* 120:1800319. doi: 10.1002/ejlt.201800319. [CrossRef] [Google Scholar] [Ref list]

Raj, N.D.; Singh, D. 2022.A critical appraisal on ferulic acid: Biological profile, biopharmaceutical challenges and nano formulations.Health Sci. Rev., 5, 100063. [CrossRef[

Randall RP, 2007. The introduced flora of Australia and its weed status., Australia: CRC for Australian Weed Management. Department of Agriculture and Food, Western Australia. 528.

Reid, K. A., Jäger, A. K., and van Staden, J. 2001. Pharmacological and phytochemical properties of Dombeya rotundifolia. *South African Journal of Botany*, *67*(2), 349–353. https://doi.org/10.1016/s0254-6299(15)31139-x

Ruales, J. J., & Jumawan, J. 2023. Geospatial Distribution Pattern of Xanthostemon F. Muell. Species (Iron Wood) in the Philippines Based on Updated Literature and Internet Digital Checklist Platforms. *Journal of Ecosystem Science and Eco-Governance*, *5*(1), 42-55.

Sakhale SA, Yadav S, Clark LV, Lipka AE, Kumar A, Sacks EJ. 2023. Genome-wide association analysis for emergence of deeply sown rice (Oryza sativa) reveals novel aus-specific phytohormone candidate genes for adaptation to dry-direct seeding in the field. Front Plant Sci. Jun 12;14:1172816. doi: 10.3389/fpls.2023.1172816. PMID: 37377815; PMCID: PMC10291202.

Semaming, Y.; Pannengpetch, P.; Chattipakorn, S.C.; Chattipakorn, N.2015. Pharmacological Properties of Protocatechuic Acid and Its Potential Roles as Complementary Medicine. Evid.-Based Complement. Altern. Med. 593-902.

Skema C, 2010. The Systematics of Dombeya Cav. and its near relatives (Dombeyaceae)., New York, USA: Cornell University.

Skema, C. 2014. Reevaluation of Species Delimitations in Dombeya Section Hilsenbergia (Dombeyaceae). Systematic Botany, 39(2), 541–562. http://www.jstor.org/stable/24546163

Skema, C., (2012). Toward a new circumscription of *Dombeya* (Malvales: Dombeyaceae): a molecular phylogenetic and morphological study of *Dombeya* of Madagascar and a new segregate genus, Andringitra.*Taxon,* 61(3) 612-628. http://www.botanik.univie.ac.at/iapt/s_taxon.php

Speisky, H., Shahidi, F., de Camargo, A. C., Fuentes, J. (2022). Revisiting the oxidation of flavonoids: loss, conservation or enhancement of their antioxidant properties. Antioxidants 11, 1–28. doi: 10.3390/antiox11010133 CrossRef Full Text | Google Scholar

Stojkovi´c, D.S.; Živkovi´c, J.; Sokovi´c, M.; Glamo˘clija, J.; Ferreira, I.C.F.R.; Jankovi´c, T.; Maksimovi´c, Z. 2013. Antibacterial activity of Veronica montana L. extract and of protocatechuic acid incorporated in a food system. Food Chem. Toxicol., 55, 209–213.

Sudheer, A.R.; Muthukumaran, S.; Kalpana, C.; Srinivasan, M.; Menon, V.P. 2007. Protective effect of ferulic acid on nicotine-induced DNA damage and cellular changes in cultured rat peripheral blood lymphocytes: A comparison with N-acetylcysteine. Toxicol. Vitr., 21, 576–585.

Sun G., Zhang S., Xie Y., Zhang Z., Zhao W. 2015.Gallic acid as a selective anticancer agent that induces apoptosis in SMMC-7721 human hepatocellular carcinoma cells. Oncol. Lett. ;11:150–158. doi: 10.3892/ol.2015.3845.

Sunitha D. A Review on Antioxidant Methods. Asian J. Pharm. Clin. Res. 2016;9:14–32. doi: 10.22159/ajpcr.2016.v9s2.13092. [Cross Ref] [Google Scholar] [Ref list]

Suwalsky M, Avello M. Antioxidant capacity of Ugni molinae fruit extract on human erythrocytes: An in vitro study. J Membr Biol. 2014;247(8):703–12. 14. Lupea AX, Pop M, Cacig S. Structure-radical scavenging activity relationships of flavonoids from Zziphus and Hdrangea extracts. Rev Chim. 2008;59(3):309–13.

Tian, X.; Peng, Z.; Luo, S.; Zhang, S.; Li, B.; Zhou, C.; Fan, H. 2019.Aesculin protects against DSS-Induced colitis though activating PPARγ and inhibiting NF-κB pathway. Eur. J. Pharmacol., 857, 172453.

Timotheé Le Péchon, Jean-Bernard Pausé, Dubuisson, J.-Y., Luc, Agathe Haevermans, Haevermans, T., and Humeau, L. 2013. *Dombeya formosa* (Malvaceae s. l.): A New Species Endemic to La Réunion (Indian Ocean) Based on Morphological and Molecular Evidence. *Systematic Botany*, *38*(2), 424–433. https://doi.org/10.1600/036364413x666732

Tsuchiya, H.; Iinuma, M. Reduction of membrane fluidity by antibacterial sophoraflavanone G isolated from Sophora exigua. Phytomedicine 2000, 7, 161–165. [CrossRef[

USDA-ARS, 2017. Germplasm Resources Information Network (GRIN). Online Database. National Germplasm Resources Laboratory, Beltsville, USA. http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl 210, Nov. 2016, pp. 262–268. https://doi.org/10.1016/j.foodchem.2016.04.114

Vélez-Gavilán J. (2022). Dombeya wallichii (pink ball). *CABI Compendium*, *1*(1). https://doi.org/10.1079/cabicompendium.113940

Wang H., Qiu C., Chen L., Abbasi A.M., Guo X., Liu R.H. 2019. Comparative study of phenolic profiles, antioxidant and antiproliferative activities in different vegetative parts of ramie *Boehmeria nivea* (L.) Molecules. ;24:1551. doi: 10.3390/molecules24081551.

Wang R., Ma L., Weng D., Yao J., Liu X., Jin F. Gallic acid induces apoptosis and enhances

the anticancer effects of cisplatin in human small cell lung cancer H446 cell line via the ROS-dependent mitochondrial apoptotic pathway. Oncol. Rep. 2016;35:3075–3083. doi: 10.3892/or.2016.4690.

Wang, H.; Chen, L.; Yang, B.; Du, J.; Chen, L.; Li, Y.; Guo, F. Structures, Sources, Identification/Quantification Methods, Health Benefits, Bioaccessibility, and Products of Isorhamnetin Glycosides as Phytonutrients. Nutrients 2023, 15, 1947.

Wianowska, D., & Olszowy-Tomczyk, M. (2023). A Concise Profile of Gallic Acid-From Its Natural Sources through Biological Properties and Chemical Methods of Determination. *Molecules (Basel, Switzerland)*, *28*(3), 1186. https://doi.org/10.3390/molecules28031186

Yu M., Chen X., Liu J., Ma Q., Zhuo Z., Chen H., Zhou L., Yang S., Zheng L., Ning C., et al. Gallic acid disruption of Aβ1–42 aggregation rescues cognitive decline of APP/PS1 double transgenic mouse. *Neurobiol. Dis.* 2019;124:67–80. doi: 10.1016/j.nbd.2018.11.009. [PubMed] [CrossRef] [Google Scholar] [Ref list]

Zhang T., Ma L., Wu P., Li W., Li T., Gu R., Dan X., Li Z., Fan X., Xiao Z. Gallic acid has anticancer activity and enhances the anticancer effects of cisplatin in non-small cell lung cancer A549 cells via the JAK/STAT3 signaling pathway. Oncol. Rep. 2019;41:1779–1788. doi: 10.3892/or.2019.6976. [PubMed] [CrossRef] [Google Scholar]

Zheng, L.-F.; Dai, F.; Zhou, B.; Yang, L.; Liu, Z.-L. Prooxidant activity of hydroxycinnamic acids on DNA damage in the presence of Cu(II) ions: Mechanism and structure–activity relationship. Food Chem. Toxicol. 2008, 46, 149–156. [CrossRef] [PubMed[

دراسة مرجعية عن الخصائص النباتية والاستخدامات التقليدية والخصائص والكيميائية لنبات الدومبيا والتشي

أسيل كاظم الأنباري[1] - ورود خالد محمد[1] - بونتشوانج بونسوك[2] - فانوم سوثيساكسوبون 3

1- قسم الأحياء، كلية التربية للعلوم الصرفة، جامعة ديالى، العراق

2- برنامج الأحياء، كلية العلوم، جامعة فاياو 56000، تايلاند

3- كلية الثقافة البيئية والسياحة البيئية، جامعة سريانخاريويروت، بانكوك 10110، تايلاند

نبات الدومبيا والتيشي هو نوع من النباتات التي تم استخدامها تقليديًا في مختلف الثقافات لخصائصها الطبية والعلاجية. ينتشر النبات في آسيا الاستوائية وأفريقيا.دراسة الاستعراض المرجعي الحالي هو تحديد الخصائص النباتية والاستخدامات الطبية الشعبية والنشاط الكيميائي والأنشطة البيولوجية. تم جمع البيانات على نبات الدومبيا والتشي باستخدام النهج الاستقرائي التحليلي القائم على مراجعة الأدبيات وتحديد ما تم تقييمه وجمعه في هذه الدراسات وقواعد البيانات الإلكترونية الإحصائية مثل EThOS وProQuest وOATD وGoogle Scholar وMedline وPubMed و Science Direct و SciFinder و SCOPUS. كشف البحث في الأدبيات عن استخدام نبات الدومبيا والتيشي تلاحظ معظم الدراسات التي أجريت على مستخلصات نبات الدومبيا والتيشي أن النوع يتمتع بقدرة مضادة للالتهابات ومضادة للميكروبات ومضادة للأكسدة. وخلصت الدراسة إلى أن التحليل الكيميائي النباتي لنبات دومبيا واليتشي كشف عن تركيبة كيميائية غنية، بما تحتوي الفلافونويدات والأحماض الفينولية والقلويدات والجليكوسيدات والصابونيات. وقد ثبت أن هذه المركبات لها أنشطة مضادة للأكسدة ومضادة للالتهابات، والتي قد تساهم في الخصائص العلاجية للنبات. كما وجد أن النبات يحتوي على الكيرسيتين والكامبفيرول وحمض الجاليك وحمض الأورسوليك، والتي ثبت أن لها نشاطًا مضادًا للالتهابات. كما ثبت أن المستخلصات النباتية لها نشاط مضاد للميكروبات ضد العديد من الكائنات الحية الدقيقة، بما في ذلك البكتيريا والفطريات.

المحكمـــون:

1- أ.د. لنجـــــا خـــــــال قسم البساتين – كلية علوم الهندسة الزراعية – جامعة السليمانية - العراق

2- أ.د. محمد أحمد إبراهيم عبدالقادر قسم البساتين – كلية الزراعة - جامعة الزقازيق - مصر.