

# An Updated Review on Phytochemistry of *Plumeria alba* L. (Apocynaceae)

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## ABSTRACT

*Plumeria alba* L. (Apocynaceae) is an ornamental tree widely distributed in tropical and subtropical regions and is well recognized in traditional medicine. Over the decades, extensive phytochemical investigations have been conducted on different parts of the plant, resulting in the identification of diverse secondary metabolites. This review aims to systematically compile and organize phytochemical data on *Plumeria alba* L. reported between 1960 and 2024, focusing on the identification and classification of secondary metabolites from different plant parts. By highlighting major and frequently reported compounds, the review provides a consolidated chemical profile to support future studies on isolation, characterization, and further scientific exploration. Key classes include iridoids, flavonoids, alkaloids, phenolics, coumarins, terpenoids (mono-, sesqui-, di-, and triterpenes), fatty acids, hydrocarbons, alkanes, alkenes, alkynes, esters, aldehydes, carboxylic acids and other miscellaneous compounds. Floral essential oils were rich in monoterpenes and sesquiterpenes, while leaves contained abundant flavonoids, phenolic acids, sugars, and amino acids. Major compounds such as plumieride, plumericin, ursolic acid, and quercetin were frequently reported. Although many of these constituents are known to possess biological activities, this review focuses solely on their chemical identification. The data provide a valuable foundation for future studies aimed at isolating, characterizing, and evaluating the bioactivity of these compounds to support potential therapeutic applications.

**Keywords:** Coumarins, Essential oils, Iridoids, Plumeria, Terpenoids.

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## INTRODUCTION

*Plumeria* L. from the Apocynaceae family, are lactiferous, deciduous shrubs found in tropical regions from southern Mexico to northern South America, the Pacific islands, the Caribbean, and India (Rudrappa *et al.*, 2022). The family comprises 366 genera, with about 133 *Plumeria* species listed, taxonomic revisions based on morphological and molecular data currently recognize only 11 validly accepted species (Bruna *et al.*, 2024).

*Plumeria alba* is an ornamental evergreen plant in gardens because of its fragrant flower. It is a medium-sized tree that can reach a height of 5-8 feet, with many branches on the upper part. The leaves are lanceolate to oblanceolate; the flowers are white in color and fragrant in corymbose fascicles (Kumari *et al.*, 2022). A few reviews on the phytochemical and pharmacological profile of the plant have been made. However, a systematic review

comprising all updated information is required. Therefore, in the present review, a comprehensive summary of the phytochemistry of *Plumeria alba* was made. It includes a detailed classification of phytoconstituents isolated from different part of the plant by various extraction and isolation techniques reported in the literature till June, 2025. The aerial parts and bark of *Plumeria alba* containing alkaloids, carbohydrates, flavonoids, phenolic compounds, and tannins (Imrana *et al.*, 2020). Traditionally, many parts of the plant considered medicinal. Its parts such as bark, leaves, latex, and flowers engage in various biological activities such as antibacterial (Radha *et al.*, 2008), antioxidant (Kirsty *et al.*, 2023), antitumor (Rudrappa *et al.*, 2022), antiarthritic (Choudhary *et al.*, 2014), hepatoprotective, and antidiabetic activities (Chowdhury *et al.*, 2010). The bark is used as purgative, emmenagogue, and febrifuge. The latex of the plant has rubefacient and purgative properties (Kumari *et al.*, 2012). It bears edible fruit; the seeds have demonstrated hemostatic properties. Latex has been used to treat herpes, ulcers, and scabies, and the powdered bark has been used as a plaster applied on hard tumors (Sura *et al.*, 2016), while the other species of the *Plumeria* are used for cardiotoxic, purgative, hypotensive, and diuretic applications (Gupta *et al.*, 2016).



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## METHODOLOGY

A detailed literature search was conducted on this plant for its phytochemistry in different search engines like PubMed, PubMed Central, SciFinder, Google Scholar, J-gate, Library Search, Science Direct, Elsevier, Semantic Scholar, PubMed Central, ResearchGate and primary sources were searched since 1960 to June, 2025. Literature searches were performed using keywords such as “*Plumeria alba* phytochemistry,” “iridoids,” “essential oil composition”, etc. Only peer-reviewed articles reporting compound isolation or chemical characterization were included. Duplicate reports and secondary citations were excluded wherever possible. To plot the phytochemistry flow diagram, we have used XmindAI software.

## RESULTS

Over the past seven decades, extensive phytochemical investigations on *Plumeria alba* have revealed a wide range of secondary metabolites isolated from different plant parts using diverse solvent systems and analytical techniques. Identified compounds include iridoids, flavonoids, terpenoids, alkaloids, phenolics, sterols, hydrocarbons, and other metabolites. Structural elucidation was achieved through NMR, MS, IR spectroscopy, and chemical degradation or biosynthetic studies. More than 200 compounds have been reported from roots, leaves, stems, bark, flowers, and aerial parts. The compiled phytochemical data are summarized in Tables 1-10 and Figure 1, many of which exhibit notable pharmacological relevance.

### Iridoids

Iridoids represent major secondary metabolites of *Plumeria alba*, showing wide distribution across plant parts. Plumieride and related derivatives were reported by Afifi *et al.*, 2006, Leena *et al.*, 2023, and Rangaswami *et al.*, 1960 from bark, stems, and leaves, while John *et al.*, 1983 identified plumericin from roots. Zhou *et al.*, 2024 recently isolated novel iridoids including allamancins A and B from flowers, highlighting continued chemical discovery and pharmacological relevance. Details of reported iridoids are summarized in Table 1.

### Flavonoids

Flavonoids have been consistently reported from methanolic leaf and floral extracts of *Plumeria alba*. Hassan *et al.*, 2015 identified kaempferol derivatives and glycosides, while Santhi *et al.*, 2009 confirmed quercetin, rutin, apigenin, catechin, and epicatechin in leaf extracts. These compounds are associated with antioxidant, anti-inflammatory, and antimicrobial activities. The identified flavonoids are summarized in Table 2.

### Terpenes and sterols

Monoterpenes dominate essential oils of leaves and flowers. Kirsty *et al.*, 2023 reported linalool, geraniol, and  $\alpha$ -terpineol,

whereas Lawal *et al.*, 2014 identified citronellol, sabinene, and limonene with ecological significance. El-Shiekh *et al.*, 2024 confirmed floral volatiles such as geranyl benzoate and nerol through headspace analysis.

Sesquiterpenes are abundant in floral and leaf essential oils. Lawal *et al.*, 2014 identified  $\beta$ -caryophyllene and (E)-nerolidol, while Sahoo *et al.*, 2021 and Mamattah *et al.*, 2023 reported germacrene B and muurolol. Additional sesquiterpenes including farnesol were detected by Rakhmawati *et al.*, 2022 and Malik *et al.*, 2023. These findings highlight the therapeutic and chemotaxonomic value of *Plumeria alba* mono and sesquiterpenes.

Diterpenes occur less frequently but remain biologically significant. Mamattah *et al.*, 2023 and Lawal *et al.*, 2014 identified phytol from essential oils, whereas Sahoo *et al.*, 2021 reported (Z,E)-geranyl linalool. Their occurrence supports the use of *Plumeria alba* in skin and wound-healing preparations.

Triterpenes including lupeol, ursolic acid, lupenone, and amyryn derivatives were reported from stems, bark, and leaves by Leena *et al.*, 2023, Rangaswami *et al.*, 1960, and Bramadhyalaselvam *et al.*, 1997. Leena *et al.*, 2023 further identified acylated derivatives such as lup-20(29)-ene-3-yl-hexanoate and related compounds. These findings suggest that triterpenes contribute significantly to the anti-inflammatory, hepatoprotective, and antidiabetic properties attributed to the plant. Terpenoidal derivatives represent acylated triterpenes, which are often associated with enhanced lipophilicity and bioavailability.

Sterols were also reported widely, with  $\beta$ -sitosterol first identified by Rangaswami *et al.*, 1960 and  $\alpha$ -sitosterol derivatives later characterized by Leena *et al.*, 2023. Terpenes and sterols are summarized in Table 3.

### Alkaloids

Floral alkaloids were extensively characterized by Sibi *et al.*, 2014 using petroleum ether fractions of ethanol extracts. Compounds including voacamine, curine, syrosingopine, and tubocurarine chloride, along with rare nitrogenous derivatives, demonstrated significant chemical diversity and pharmaceutical potential. They also identified rare nitrogenous compounds like benzo[f]quinazoline and naphthalenedione derivatives, indicating high chemical diversity. A comprehensive list of alkaloids reported from flowers of *Plumeria alba* was provided in Table 4. These findings highlight the pharmaceutical potential of floral alkaloids and expand the phytochemical profile of *Plumeria alba* beyond iridoids and terpenoids.

### Phenolics, coumarins and aromatic compounds

Phenolic acids such as rosmarinic, ferulic, ellagic, and p-coumaric acids were identified from methanolic leaf extracts by Hassan *et al.*, 2015, while Kirsty *et al.*, 2023 reported volatile phenolics including 2-methoxy-4-vinylphenol. Coumarins including

scopoletin were reported by Malik *et al.*, 2023, Rangaswami *et al.*, 1960, and Leena *et al.*, 2023 from stems, bark, and flowers.

Benzene derivatives such as catechol and hydroquinone were identified by Kirsty *et al.*, 2023, while Lawal *et al.*, 2014 reported aromatic essential oil constituents. Furan derivatives including furfural and hydroxymethylfurfural were reported from aqueous flower extracts by Sahoo *et al.*, 2021. Aromatic acids such as salicylic acid and benzoic acid were detected by Hassan *et al.*, 2015 and Rakhmawati *et al.*, 2022. These detailed list constituents were summarized in Table 5.

## Hydrocarbons

Hydrocarbons including decane, heptadecane, and n-heneicosane were reported from essential oils by Kirsty *et al.*, 2023 and Lawal *et al.*, 2014. Long-chain alkanes such as hexadecane and

hentriacontane were confirmed by Lawal *et al.*, 2014, Kirsty *et al.*, 2023, Anggoro *et al.*, 2020, and Sahoo *et al.*, 2021. Alkenes including cetene and docosene were reported by Lawal *et al.*, 2014 and Kirsty *et al.*, 2023, whereas alkynes such as 1,8-nonadiyne were identified by Sahoo *et al.*, 2021. Non-polar hydrocarbon constituents identified primarily from essential oil fractions were compiled in Table 6.

## Fatty Acids and their Derivatives

Fatty acids including octadecanoic, hexadecanoic, oleic, and linolenic acids were reported from solvent and essential oil extracts by Lawal *et al.*, 2014 and Sahoo *et al.*, 2021. Fatty acids and related carboxylic acid derivatives identified from solvent extracts were presented in Table 7. Kirsty *et al.*, 2023 added 9,12,15-octadecatrienoic acid methyl ester and geranic acid, highlighting the plant's rich lipid profile.

**Table 1: Iridoids reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
1		Plumieride	Chloroform:methanol:water (80:20:2) fraction of ethylacetate extract	Stem bark	Afifi <i>et al.</i> , 2006
			Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
			Petroleum ether	Bark	Rangaswami <i>et al.</i> , 1960
2		Plumieride acid	Ethylacetate:methanol:water (100:16.5:13.5) fraction of n-butanol extract	Leaves	Afifi <i>et al.</i> , 2006
3		Plumieride glucoside	Chloroform:ethanol (2:1)	Bark	Rangaswami <i>et al.</i> , 1960
4		Plumieridecoumarate	Methanol	Roots, stem, leaves	John <i>et al.</i> , 1983
			N/A	Leaves and stem bark	Bramadhayalaselvam <i>et al.</i> , 1997
5		Plumieride coumerate glucoside	Methanol	Roots, stem, leaves, flowers	John <i>et al.</i> , 1983
6		Plumericin	Methanol	Roots	John <i>et al.</i> , 1983
7		Isoplumericin	Methanol	Roots	John <i>et al.</i> , 1983
8		Fulvoplumerin coumarone	N/A	Leaves and bark	Anggoro <i>et al.</i> , 2020
9		Resinic acid	N/A	Leaves and bark	Anggoro <i>et al.</i> , 2020
10		Protoplumericin A	Ethylacetate-methanol-water (100:16.5:13.5) fraction of n-butanol extract	Stem bark and leaves	Afifi <i>et al.</i> , 2006
11		Allamancins A	N/A	Flowers	Xin <i>et al.</i> , 2024
12		allamancins B	N/A	Flowers	Xin <i>et al.</i> , 2024
13		3-O-methylallamancin	N/A	Flowers	Xin <i>et al.</i> , 2024

N/A: Not available

**Table 2: Flavonoids identified from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Flavonoids				
14		Quercetin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
15		Kaempferol	Methanol	Leaves	Hassan <i>et al.</i> , 2015
			Diethyl ether fraction of ethanol extract	Flowers	Santhi <i>et al.</i> , 2009
16		Kaempferol 4'-O-glucoside	Ethyl acetate fraction of ethanol extract	Flowers	Santhi <i>et al.</i> , 2009
17		Rutin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
18		Herperetin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
19		Narennigin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
20		Catechin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
21		Epicatechin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
22		Apigenin	Methanol	Leaves	Hassan <i>et al.</i> , 2015
23		Diosmitin	Methanol	Leaves	Hassan <i>et al.</i> , 2015

### Oxygenated volatile constituents

Oxygenated constituents including cyclic ketones, alcohols, aldehydes, esters, and pyranone derivatives were reported from solvent and essential oil extracts. Kirsty *et al.*, 2023, Lawal *et al.*, 2014, Rangaswami *et al.*, 1960, and Sahoo *et al.*, 2021 documented multiple aroma-active and antimicrobial compounds contributing to fragrance and biological activity. Though present in low amounts, their volatility and reactivity may contribute to both aroma and antimicrobial activity. Aliphatic carboxylic acids which are known for its antioxidant potential and UV-protective effects. Esters commonly used in perfumery for their fragrance-fixative properties. Oxygenated volatile compounds, including alcohols, aldehydes, ketones, esters, were detailed in Table 8.

### Primary metabolites

Hassan *et al.*, 2015 reported sugars including fucose, rhamnose, arabinose, glucose, and mannose along with polysaccharide complexes from hot water leaf extracts. The same study identified seventeen amino acids within protein-bound polysaccharides, indicating nutritional relevance. Primary metabolites such as sugars, amino acids, and polysaccharide complexes identified from aqueous leaf extracts are summarized in Table 9.

### Miscellaneous Compounds

A small but diverse group of miscellaneous compounds has been identified in *Plumeria alba*, highlighting its broad phytochemical profile. These include lignans, vitamin E, aromatic ethers, apocarotenoids, sulfur compounds, and pyranone derivatives were reported by Rangaswami and Rao, 1960; Anggoro *et al.*, 2020; Kirsty *et al.*, 2023; and Sahoo *et al.*, 2021. Phthalate esters were also detected in floral extracts by Lawal *et al.*, 2014 and Sahoo *et al.*, 2021. These constituents, though present in low amounts, add to the plant's pharmacological and industrial relevance. The list of phytoconstituents under this category were presented in Table 10.

## DISCUSSION

The compiled phytochemical evidence establishes *Plumeria alba* L. as a metabolically rich Apocynaceae species characterized by a consistent secondary metabolite profile. Iridoids, particularly plumieride, plumericin, and related derivatives, represent defining chemotaxonomic markers of the genus, consistent with biosynthetic patterns observed in closely related taxa such as *Allamanda*. Several iridoids and terpenoids exhibit defined stereochemical configurations influencing biological activity, as demonstrated by NMR and optical rotation studies; however,

**Table 3: Terpenoids and sterols reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Monoterpenes				
24		3,7-dimethyl-2,6-Octadienol	Steam distilled essential oil	Flowers	Kirsty et al., 2023
25		1,6-Octadien-3-ol, 3,7-dimethyl-	Steam distilled essential oil	Leaves	Kirsty et al., 2023
26		2,6-octadien-1-ol, 3,7-dimethyl-, acetate, (Z)-/neryl acetate	Methanol	flowers	Malik et al., 2023
27		Linalool	Steam distilled essential oil	Flowers	Kirsty et al., 2023
			Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
			Essential oil extracted with water by headspace	Flowers	EI-Shiekh et al., 2024
			Steam distilled essential oil	Flowers	Sahoo et al., 2021
28		Geraniol	Steam distilled essential oil	Flowers	Kirsty et al., 2023
			Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
29		Citronellol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
30		$\alpha$ and $\beta$ -Pinene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
31		Sabinene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
32		$\delta$ -2-Carene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
33		$\alpha$ and $\beta$ -Phellandrene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
34		Limonene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
35		(E)- $\beta$ -Ocimene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
36		$\gamma$ -Terpinene	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
37		Cis-Verbenol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
38		Lavandulol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
39		Terpinen-4-ol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
40		p-Cymen-8-ol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
41		$\alpha$ -Terpineol	Steam distilled essential oil	Flowers	Kirsty et al., 2023
			Butanol	Flowers	Mohammad 2020
			Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
			Steam distilled essential oil	Flowers	Sahoo et al., 2021
42		Geranial	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
43		Geranyl benzoate	Steam distilled essential oil	Flowers	EI-Shiekh et al., 2024
			Steam distilled essential oil	Flowers	Sahoo et al., 2021

44		Neryl acetate	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
45		Neryl acetone	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
46		Trans-sabinene hydrate acetate	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
47		Nerol	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
	Sesquiterpenes				
48		Muurolol	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
49		Nerolidol 2	Hexane	Flowers	Mohammad <i>et al.</i> , 2020
50		1,6,10-dodecatrien-3-ol, 3,7,11-trimethyl-, [S-(Z)]-	Methanol	flowers	Malik <i>et al.</i> , 2023
51		d-Nerolidol	Ethanol	Flowers	Rakhmawati <i>et al.</i>
52		1,6,10-Dodecatrien-3-ol	Ethanol	Flowers	Rakhmawati <i>et al.</i>
53		Farnesol	Ethanol	Flowers	Rakhmawati <i>et al.</i>
			Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
54		3,7,11-Trimethyl-3-hydroxy-6,10-dodecadien-1-yl acetate	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023
55		(Z,E)-Farnesol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
			Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
56		$\alpha$ -Bisabolol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
			Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
57		$\delta$ -Cadinol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
58		Caryophyllene oxide	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
59		Spathulenol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
60		$\Gamma$ and $\delta$ -Cadinene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
61		$\beta$ -Sesquiphellandrene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
62		(E)-Nerolidol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
63		Viridiflorol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
64		6,10,14-Trimethyl-2-pentadecanone	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
65		(E)- $\beta$ -Ionone	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
66		Zingiberene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
67		$\alpha$ -Chamigrene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
68		(E,E)- $\alpha$ -Farnesene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
69		$\alpha$ -Bulnesene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014

70		$\beta$ -Bisabolene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
71		$\beta$ -Caryophyllene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
72		Trans- $\alpha$ -Bergamotene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
73		$\beta$ -Santalene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
74		$\gamma$ -Muuroolene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
75		$\beta$ -Elemene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
76		Elemol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
77		Germacrene B	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
78		8-cedren-13-ol	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
	Diterpenes				
79		Phytol	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
			Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
80		Ledol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
81		(Z, E)-geranyl linalool	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
	Triterpenes				
82		Amyrin	Petroleum ether	Bark	Rangaswami <i>et al.</i> , 1960
83		Amyrin acetate	Petroleum ether	13	EI-Shiekh <i>et al.</i> , 2024
			N/A	Leaves and stem bark	Bramadhyalaselvam <i>et al.</i> , 1997
84		Betulin	N/A	Leaves and bark	Anggoro <i>et al.</i> , 2020
85		Lupeol	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
86		Lupenone	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
87		Friedeline	N/A	Leaves and bark	Anggoro <i>et al.</i>
88		Taraxerol	N/A	Leaves and bark	Anggoro <i>et al.</i>
89		3-O-acetylbetulin	N/A	Leaves and bark	Anggoro <i>et al.</i>
90		Ursolic acid	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
				Leaves and stem bark	Bramadhyalaselvam <i>et al.</i> , 1997

91		Squalene	Hexane	Flowers	Mohammad <i>et al.</i> , 2020
			Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
	Triterpenoid derivatives				
92		Lup-20(29)-ene-3-yl-hexanoate	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i>
93		3 $\beta$ -O-acetylolean-12-ene	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i>
94		3 $\beta$ -O-acetyl-lup-20(29)-ene	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i>
	Sterols				
95		$\beta$ -sitosterol	Petroleum ether	Bark	Rangaswami <i>et al.</i> , 1960
96		$\alpha$ -sitosterol glucoside	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i>
97		$\alpha$ -sitosterol	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i>

**Table 4: Alkaloids identified from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
98		Voacamine	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
99		1,3-Di(4-bromophenyl) benzo[f]quinazoline	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i>
100		Vobtusine, 2',3'-didehydro-2'-deoxy	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i>
101		Curine	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
102		Pyrrolidine 1-[3.alpha., 7.alpha., 12.alpha.-tris(trimethylsiloxy)-5. beta.-cholan-24-oyl]	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
103		Syrosingopine	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
104		1,4-Naphthalenedione, 2-(3,7,11,15,19,23,27,31-octamethyl-2,6,10,14,18,22,26,30-dotriacontaoctaenyl), (all-E)-	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
105		Cycleanine, O7, O7'-didemethyl-, (1.alpha., 1'.alpha.)	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024

106		Evonine	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
107		Evonimine, 8-(acetyloxy)-O <sub>2</sub> -benzoyl-O-2-deacetyl-8-deoxo-26-hydroxy-, (8.alpha.)	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024
108		Tubocurarine chloride	Petroleum ether fraction of ethanol extract	Flowers	Sibi <i>et al.</i> , 2024

**Table 5: Phenolics, coumarins, and aromatic compounds reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Phenolic compounds				
109		Phenol	Methanol	Flowers	Malik <i>et al.</i> , 2023
110		2-Methoxy-4-vinyl phenol	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
111		Phenol, 2,4-bis (1,1-dimethyl ethyl)	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
112		Pyrogallol	Methanol	Leaves	Hassan <i>et al.</i> , 2015
113		Rosamarinic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
114		Ferulic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
115		Vanilic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
116		Ellagic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
117		Protocatechuic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
118		P-coumaric acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
119		Methyl eugenol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
120		Zingerone	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
	Coumarin and its glycoside				
121		Benzofuran, 2,3-dihydro	Methanol	Flowers	Malik <i>et al.</i> , 2023
			Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
			Dichloromethane	Flowers	Mohammad <i>et al.</i> , 2020
122		Scopoletin	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
			Ether	Bark	Rangaswami <i>et al.</i> , 1960
	Benzene derivatives				
123		Catechol	Methanol	Flowers	Malik <i>et al.</i> , 2023

			Dichloromethane	Flowers	Mohammad <i>et al.</i> , 2020
124		Hydroquinone	Methanol	flowers	Malik <i>et al.</i> , 2023
125		Benzene, 1-isocyano-3-methyl	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023
	Furan derivatives				
126		Furfural	Water	Flowers	Mohammad <i>et al.</i> , 2020
127		5-Hydroxymethylfurfural	Water	Flowers	Mohammad <i>et al.</i> , 2020
128		2-Furanmethanol	Water	Flowers	Mohammad <i>et al.</i> , 2020
	Aromatic carboxylic acids				
129		Benzoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
130		Salicylic acid	Methanol	Leaves	Hassan <i>et al.</i> , 2015
131		1,2-Benzenedicarboxylic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022

**Table 6: Hydrocarbon constituents identified from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Alkanes				
132		1,3-propanediamine, N-methyl-	Methanol	Flowers	Malik <i>et al.</i> , 2023
133		Dodecane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
134		Hexadecane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
			Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
135		Octadecane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
136		Tetradecane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
			Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
137		Hexacosane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
138		Docosane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
			Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
139		Tetracosane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
140		Hentriacontane	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023

141		Octacosane	Steam distilled essential oil	Leaves	Kirsty et al., 2023
142		Eicosane	Steam distilled essential oil	Leaves	Kirsty et al., 2023
			Hexane	Flowers	Mohammad et al., 2020
143		n-Tridecane	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
144		Oxacyclotetradecane-2	Ethanol	Flowers	Rakhmawati et al., 2022
145		n-Nonadecane	Steam distilled essential oil	Flowers	Sahoo et al., 2021
146		n-Tricosane	Steam distilled essential oil	Flowers	Sahoo et al., 2021
147		3,7,11-tridecatrienitrile, 4,8,12-trimethyl	Methanol	flowers	Malik et al., 2023
148		Heptadecane	Methanol	Flowers	Malik et al., 2023
149		Decane	Steam distilled essential oil	Leaves	Kirsty et al., 2023
150		n-heneicosane	Steam distilled essential oil	Flowers	Sahoo et al., 2021
	Alkenes				
151		Cetene	Steam distilled essential oil	Leaves	Kirsty et al., 2023
152		1-Docosene	Steam distilled essential oil	Leaves	Kirsty et al., 2023
153		10-Heneicosene	Steam distilled essential oil	Flowers	Kirsty et al., 2023
154		3-Tetradecene	Steam distilled essential oil	Flowers	Kirsty et al., 2023
155		4-Nonene	Ethanol	Flowers	Rakhmawati et al., 2022
156		1-Nonene	Ethanol	Flowers	Rakhmawati et al., 2022
157		1-Decene	Ethanol	Flowers	Rakhmawati et al., 2022
158		4-methyl-1,5-heptadiene	Methanol	flowers	Malik et al., 2023
	Alkynes				Rakhmawati et al., 2022
159		1,8-Nonadiyne	Ethanol	Flowers	Rakhmawati et al., 2022
160		9-Octadecyne	Methanol	Flowers	Malik et al., 2023
	Aromatic hydrocarbons				
161		m-dimethylbenzene	Steam distilled essential oil	Flowers	Kirsty et al., 2023
162		1-Ethyl-2-heptylcyclopropane	Steam distilled essential oil	Flowers	Kirsty et al., 2023

**Table 7: Fatty acids and organic acids reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
163		Acetic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
164		Octadecanoic acid	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
165			Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
166		Methyl octadecanoate	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
167		2-Propenyl octanoate	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
168		Pentadecanoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
169		Octanoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
170		Tetradecanoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
171		Cyclopentaneundecanoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
172		Oleic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
173		Hexanoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
174		9-Hexadecenoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
175		Tricosanoic acid	Chloroform:acetone fraction of dichloromethane:methanol (1:1) extract	Stems and leaves	Leena <i>et al.</i> , 2023
176		Neric acid	Butanol	Flowers	Mohammad <i>et al.</i> , 2020
177		Geranic acid	Hexane	Flowers	Mohammad <i>et al.</i> , 2020
178		9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)	Methanol	flowers	Malik <i>et al.</i> , 2023
179		2-Propenyl hexanoate	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
180		9,12,15-Octadecatrienoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
181		9,12-Octadecadienoic acid	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
182		Hexadecanoic acid	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
			Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
183		Hexadecanoic acid, 15-methyl-, methyl ester	Methanol	flowers	Malik <i>et al.</i> , 2023
184		Hexadecanoic acid methyl ester	Hexane	Flowers	Mohammad <i>et al.</i> , 2020
185		9-Octadecenoic acid (Z)-methyl ester	Hexane	Flowers	Mohammad <i>et al.</i> , 2020
186		1-Pentadecanal	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023
187		1-Hexadecanol	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
188		1-Nonanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
189		1-Eicosanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
190		1-Tetracosanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
191		1-Hexadecen-1-ol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
192		1-Hexacosanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
193		Trans-2-Tridecenal	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
194		(E,E)-2,4-Heptadienal	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014

195		n-Nonanal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
196		(E,Z)-2,6-Nonadienal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
197		(E)-2-Nonenal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
198		Non-2-en-1-ol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
199		(E)-2-Decenal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
200		(E,E)-2,4-Decadienal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
201		Tetradecanal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
202		Methyl octadecanoate	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
203		Methyl linoleate	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
204		Methyl palmitate	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
205		Isopropyl myristate	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
206		1-Dodecanol	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014
207		n-Decanal	Steam distilled essential oil	Leaves and flowers	Lawal et al., 2014

**Table 8: Oxygenated volatile constituents identified from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Cyclic ketones				
208		2-Cyclopenten-1-one, 2-hydroxy	Methanol	flowers	Malik et al., 2023
209		Cyclononanone	Methanol	flowers	Malik et al., 2023
210		4,5-Dihydro-2 (1H)-pentalenone	Steam distilled essential oil	Flowers	Kirsty et al., 2023
211		Ethanone, 1-(6,6-dimethylbicyclo [3.1.0] hex-2-en-2-yl)-	Steam distilled essential oil	Flowers	Kirsty et al., 2023
212		3,3'-Dimethoxybenzil	Methanol	Flowers	Malik et al., 2023
213		5-Methyl-1,3-cyclohexanedione	Ethanol	Flowers	Rakhmawati et al., 2022
214		8a-Hydroxy-3,3,6,6,8,8-hexamethyl-1,2-benzodioxine-5,7-dione	N/A	Leaves and bark	Anggoro et al., 2020
215		2,3-Dihydro-3,5-dihydroxy-6-methyl-4HPyran-4-one	Dichloromethane	Flowers	Mohammad et al., 2020
	Alcohols				
216		Phenyl ethyl alcohol	Steam distilled essential oil	Flowers	Kirsty et al., 2023

			Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
217		2-Methyl benzyl alcohol	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023
218		Benzyl alcohol	Methanol	Flowers	Malik <i>et al.</i> , 2023
			Butanol	Flowers	Mohammad <i>et al.</i> , 2020
219		2-Ethylhexanol	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
220		Cyclohexanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
221		Cyclopentadecanol	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
222		1-Decanol, 2-hexyl	Methanol	Flowers	Malik <i>et al.</i> , 2023
223		cis-Linalool oxide	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
	Aldehyde				
224		E-15-heptadecenal	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
225		Benzaldehyde	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
226		Phenyl acetaldehyde	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
	Esters				
227		Norborneol acetate	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
228		Benzyl salicylate	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
229		Benzyl benzoate	Steam distilled essential oil	Flowers	Sahoo <i>et al.</i> , 2021
230		Sulfurous acid, dodecyl 2-propyl ester	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023

N/A: Not available

**Table 9: Primary metabolites (sugars and amino acids) reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
	Sugars				
231		Fucose	NaOH as eluent for Hot water extract	Leaves	Hassan <i>et al.</i> , 2015
232		Rhamnose	NaOH as eluent for Hot water extract	Leaves	Hassan <i>et al.</i> , 2015
233		Arabinose	NaOH as eluent for Hot water extract	leaves	Hassan <i>et al.</i> , 2015

234		Galactose	NaOH as eluent for Hot water extract	leaves	Hassan <i>et al.</i> , 2015
235		Glucose	NaOH as eluent for Hot water extract	leaves	Hassan <i>et al.</i> , 2015
236		Mannose	NaOH as eluent for Hot water extract	leaves	Hassan <i>et al.</i> , 2015
237		Polysaccharide complex	NaOH as eluent for Hot water extract	leaves	Hassan <i>et al.</i> , 2015
	Amino acids				Hassan <i>et al.</i> , 2015
238		Aspartic acid	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
239		Threonine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
240		Glutamic acid	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
241		Serine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
242		Valine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
243		Alanine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
244		Glycine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
245		Arginine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
246		Histidine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
247		Leucine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
248		Phenylalanine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
249		Proline	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
250		Valine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
251		Lysine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
252		Tyrosine	Protein bound polysaccharide in hot water extract	leaves	Hassan <i>et al.</i> , 2015
253		Isoleucine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
254		Cysteine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015
255		Methionine	Protein bound polysaccharide complex in hot water extract	leaves	Hassan <i>et al.</i> , 2015

**Table 10: Miscellaneous compounds reported from *Plumeria alba* L.**

Compound No.	Category	Name of the compound	Extract	Part of the plant	References
256	Lignin	(+/-)-1,4-O-diferuloylsecoisolariciresionol	N/A	Leaves and bark	Anggoro <i>et al.</i> , 2020
257	Vitamin	Vitamin E	N/A	Leaves and bark	Anggoro <i>et al.</i> , 2020
258	cyclohexane derivative	1,4-cyclohexanedimethanamine	Methanol	flowers	Malik <i>et al.</i> , 2023
259	Ketone derivative	2-Butanone, 4-[2-isopropyl-5-methyl-5-(2-methyl-5-oxocyclopentyl) cyclopentenyl]-	Steam distilled essential oil	Flowers	Kirsty <i>et al.</i> , 2023
260	cyclic aromatic ether	3,5-Dimethylanisole	Methanol	Flowers	Malik <i>et al.</i> , 2023
261	Glycerone	Dihydroxyacetone	Water	Flowers	Mohammad <i>et al.</i> , 2020
262	Apocarotenoid	$\beta$ -Cyclocitral	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
263	Naphthalene derivative	$\alpha$ -Methylnaphthalene	Steam distilled essential oil	Leaves and flowers	Lawal <i>et al.</i> , 2014
264	Pentene derivative	2-Pentene, 4-bromo	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
265	Inorganic compound	Silane	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
266	Organic disulfane	Di-2-Benzothiazole disulfane	Ethanol	Flowers	Rakhmawati <i>et al.</i> , 2022
267	Pyranone	4H-pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl	Methanol	Flowers	Malik <i>et al.</i> , 2023
268	Pyranone	Glycerin 2,3-dihydro-3,5-dihydroxy-6-methyl-4(H)-pyran-4-one	Water	Flowers	Mohammad <i>et al.</i> , 2020
269	Pthalate ester	1,2-Benzenedicarboxylic acid, butyl 8-methyl nonyl ester	Steam distilled essential oil	Leaves	Kirsty <i>et al.</i> , 2023
270	Pthalate ester	Bis(2-ethylhexyl) phthalate	Ethyl acetate	Flowers	Mohammad <i>et al.</i> , 2020

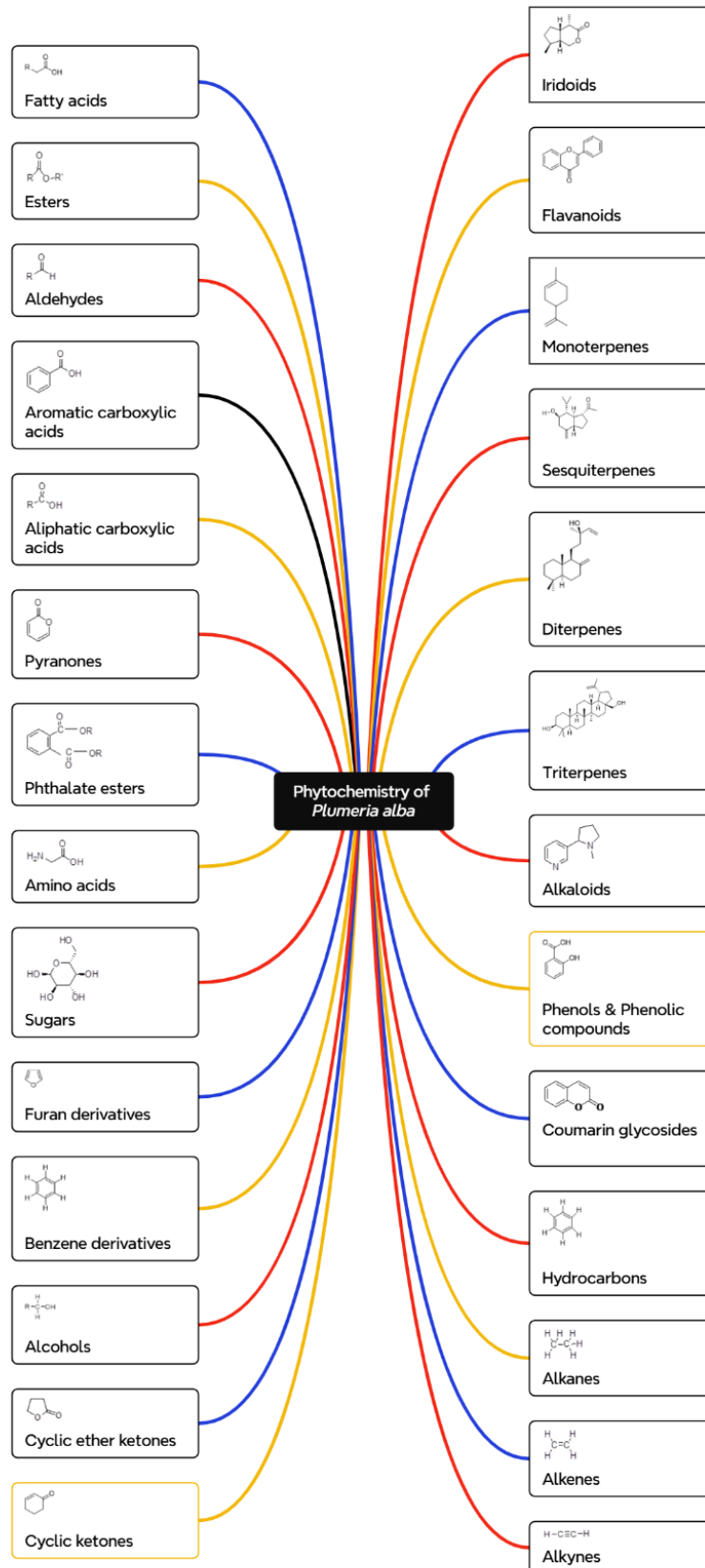
N/A: Not Available.

stereochemical characterization remains limited for many recently reported metabolites.

Flavonoids and phenolic compounds, predominantly localized in leaves and flowers, indicate a conserved antioxidant framework, while mono- and sesquiterpenes in floral essential oils emphasize ecological roles in pollinator attraction and defense. Polar solvents such as methanol and ethanol preferentially extracted flavonoids, phenolics, sugars, and amino acids, whereas non-polar solvents including petroleum ether and hexane favored sterols, triterpenes, hydrocarbons, and fatty acids, with essential oil constituents

primarily obtained through steam distillation. Accordingly, leaves and flowers represent the most chemically diverse and pharmacologically promising plant parts.

The presence of triterpenes, sterols, alkaloids, and modified terpenoid derivatives further expands the chemical space of *P. alba*, although most studies remain descriptive with limited mechanistic evaluation. Overall, the phytochemical consistency across plant parts and decades supports its placement within iridoid- and terpenoid-rich Apocynaceae and highlights opportunities for bioactivity-guided and translational research.



**Figure 1:** Major classes of secondary metabolites present in *Plumeria alba*.

## CONCLUSION

This comprehensive review highlights the diverse phytochemical profile of *Plumeria alba*, as reported in literature spanning from the 1960s to recent years. Major compound classes include iridoids, flavonoids, terpenoids (mono-, sesqui-, di-, and triterpenes), alkaloids, phenolics, coumarins, and fatty acids, each contributing distinct pharmacological activities. Numerous volatile compounds such as aldehydes, alcohols, esters, and hydrocarbons enhance its aromatic and therapeutic value. Floral parts were especially rich in volatile oils and alkaloids, while leaves yielded abundant phenolics and fatty acids. Several bioactive molecules, including scopoletin, ursolic acid, quercetin, and plumericin, support traditional medicinal uses. Antimicrobial, antioxidant, anti-inflammatory, and cytoprotective properties were commonly associated across classes. The presence of rare and structurally diverse compounds like apocarotenoids, sulfur derivatives, and lignans further adds to its pharmacological potential. Many constituents also suggest applications in cosmetics, perfumery, and nutraceuticals. The findings lay a solid foundation for future research aimed exploring their biological effects through well-designed pharmacological and mechanistic studies. Establishing robust links between specific phytochemicals and their bioactivities will be crucial for validating the therapeutic potential of *Plumeria alba* and guiding its applications in medicine, cosmetics, and nutraceuticals.

## ACKNOWLEDGEMENT

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## ABBREVIATIONS

**NMR:** Nuclear Magnetic Resonance; **IR:** Infrared; **GC/MS:** Gas Chromatography-Mass Spectrometry; **HMF:** 5-Hydroxymethylfurfural; **UV:** Ultraviolet.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## FUNDING

The authors received no funding for this work.

## ETHICAL STATEMENT

This article is a review article and does not involve any studies with animals or human participants. Hence, ethical approval was not required.

## AUTHOR CONTRIBUTIONS

S.V.V.N.S.M.L. conceptualized and designed the review. K.T.S., K.N.K., K.S., and K.M. collected and curated the literature data. All authors contributed to data interpretation, manuscript drafting, and approved the final version.

## STATISTICAL ANALYSIS

No statistical analysis was performed, as this study is based on a qualitative review of previously published literature.

## SUMMARY

This review consolidates over six decades of phytochemical research on *Plumeria alba* L., presenting a comprehensive chemical profile of the species. The compiled data serve as a valuable reference for future isolation, bioactivity, and drug-discovery studies.

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