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Efektivitas Farmakologi Senyawa Aktif Tumbuhan Mangrove Yang Hidup Di Indonesia

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Abstract
Mangroves are ecologically important plants in marine habitats that occupy the coastlines of several countries. Apart from their primary ecological importance, various parts of mangroves are widely used in traditional medicine and are claimed to be effective in treating various diseases. At present, no comprehensive effort has been made to compile and critically analyze the published literature in view of its ethnopharmacological utility. This review aims to provide a comprehensive overview of the biodiversity and distribution of mangrove plants, ethnopharmacology, phytochemical profiles, and pharmacological activities of mangrove plants used as traditional medicine in Indonesia. The method used is by using literature studies from the Science Direct, Pubmed, and Google Scholar database. Result show that In Indonesia, there are 33 types of mangrove species, all of which are traditionally used as medicine, which are spread throughout the archipelago in Indonesia. Bioactive compounds obtained from mangrove plants include polyphenols, flavonoids, alkaloids, carotenoids, tannins, saponins, steroids, amino acids, carbohydrates, proteins, vitamins etc. This review also shows that the pharmacological activities of mangrove plants in general include antimicrobials (such as antibacterial, antiviral and antifungal), anti-inflammatory, anti-ulcer, antidiarrheal, anticancer, antidiabetic, anti-HIV, antinociceptive, hepatoprotective, antiarthritis, analgesic, antioxidant and cytotoxic activities.

Keywords: *Mangrove, Biodiversity, Phytochemical, Bioactive Compound, Pharmacological*

Abstrak
Mangrove merupakan tumbuhan yang penting secara ekologis di habitat laut yang menempati garis pantai beberapa negara. Selain kepentingan ekologis utama mereka berbagai bagian mangrove secara luas digunakan dalam pengobatan secara tradisional dan diklaim efektif untuk mengobati berbagai macam penyakit. Saat ini, tidak ada upaya komprehensif yang dilakukan untuk menyusun dan menganalisis secara kritis literatur yang diterbitkan mengingat kegunaan etnofarmakologinya. Tinjauan ini bertujuan untuk memberikan gambaran yang komprehensif tentang biodeversitas dan pesebaran tumbuhan mangrove, etnofarmakologi, profil fitokimia,dan aktivitas farmakologis tumbuhan mangrove yang digunakan sebagai pengobatan tradisional di Indonesia. Metode yang digunakan dengan menggunakan studi literatur dari database *Science Direct, Pubmed, dan Google Scholar*. Hasil analisis menunjukkan bahwa di Indonesia terdapat 33 jenis spesies mangrove yang semuanya secara tradisional digunakan sebagai obat yang tersebar di seluruh kepulauan di Indonesia. Senyawa bioaktif yang diperoleh dari tumbuhan mangrove meliputi polifenol, flavonoid, alkaloid, karotenoid, tanin, saponin, steroid, asam amino, karbohidrat, protein, vitamin dll. Dalan review ini juga menunjukkan aktivitas farmakologis tumbuhan mangrove secara umum meliputi antimikroba (seperti antibakteri, antivirus dan antijamur), antiinflamasi, antimaag, antidiare, antikanker, antidiabetes, anti-HIV, antinociceptive, hepatoprotektif, antiarthritis, analgesik, antioksidan dan aktivitas sitotoksik.

Kata kunci: Mangrove, Biodiversitas, Fitokimia, Senyawa Bioaktif, Farmakologi

1. Pendahuluan

Tanaman obat telah digunakan sebagai pengobatan baik yang bersifat preventif, kuratif maupun rehabilitatif sejak zaman dahulu. Zat aktif dari tamanan digunakan sebagai pengobatan terhadap penyakit sehingga mempunyai nilai terapeutik. Menurut WHO 80 % masyarakat di seluruh dunia memanfaatkan tanaman obat dalam perawatan kesehatan [1].

Salah satu tanaman obat yang banyak digunakan sebagai pengobatan adalah tumbuhan mangrove. Tumbuhan mangrove merupakan tanaman khusus yang dapat tumbuh pada kondisi pasang surut ekstrim, kadar salinitas tinggi dan tanah anaerobik. Di dunia terdapat sekitar 84 spesies tumbuhan mangrove yag terdiri dari 70 spesies tumbuhan mangrove sejati dan 14 spesies mangrove asosiasi. Indonesia merupakan salah satu negara di Asia yang menpunyai hutan mangrove terluas di dunia yang tersebar dari sabang sampai merauke. Luas hutan mangrove di Indonesia ± 42.550 km^2 yang tersebar dalam 257 kota/kabupaten. Di Indonesia tercatat sedikitnya terdapat 40 sampai 50 spesies mangrove yang merupakan keanekagaman mangrove tertinggi di dunia. Keragaman jenis mangrove antara satu pulau dengan pulau lainnya di Indonesia berbeda satu sama lain [2].

Tumbuhan mangrove secara tradisional banyak dimanfaatkan sebagai pakan ternak, bahan makanan dan pengobatan. Di Asia tumbuhan mangrove *Avicennia officinalis, Avicennia marina, Sonneatia caseolaris, Acanthus ilicifolius, Aegiceras rotundifolia, Ceriops decandra, Exocoecaria agallocha, Kandelia candel, Nypa fruticans, Rhizophora mucornata dan Rhizopora mangle* banyak digunakan dalam pengobatan penyakit kulit, kusta, bisul, tuberkulosis, kaki gajah, malaria dan disentri. Selain itu tumbuhan mangove diatas juga digunakan dalam pengobatan asma, radang, radang sendi, rematik dan diabetes [3]. Senyawa metabolit sekunder dari tumbuhan mangrove secara ilmiah mempunyai aktivitas farmakologi sebagai antioksidan, hepatoprotektif, antibakteri, antifungi, antiinflamsi, analgetik dan sitotoksik [4]. Review ini terfokus pada senyawa metabolit sekunder yang terkandung dalam tumbuhan mangerove yang terdapat di Indonesia yang mempunyai aktivitas farmakologi.

Mangrove biodiversity in Indonesia, chemical content of mangrove plants, and pharmacological activities of mangroves

2. Metode

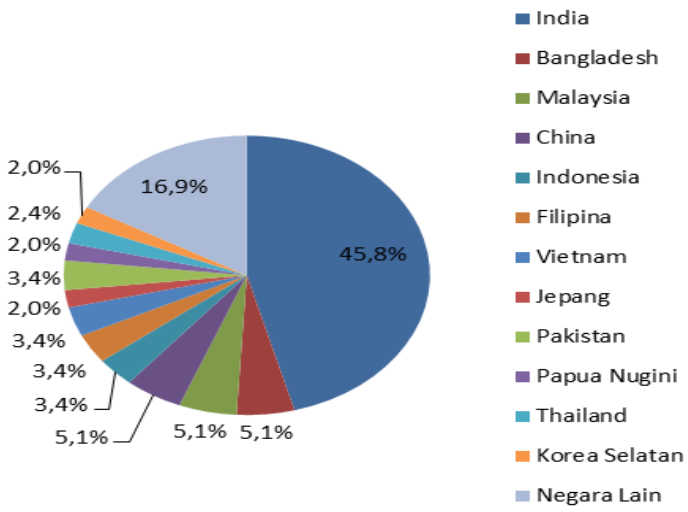
Penelitian ini merupakan penelitian kualitatif non eksiperimental tentang jenis tumbuhan mangrove di Indonesia dan aktivitas farmakologis tumbuhan mangrove yang ada di Indonesia. Studi literatur dalam proses *review* artikel ini dilakukan dengan mencari sumber literatur secara *online* di internet dengan kata kunci "*Mangrove biodiversity in Indonesia, chemical constituens of mangrove plants*, dan *pharmacological activities of mangroves*". Sumber data primer yang digunakan diantaranya adalah jurnal nasional maupun jurnal internasional yang diterbitkan dalam 10 tahun terakhir. Pencarian database elektronik bersumber dari *PuB Med , google schoolar dan elsefier/Science direct*.

3. Hasil dan Pembahasan

Hasil

Berdasarkan data dari WHO (Organisasi Kesehatan Dunia), lebih dari 80 % penduduk di dunia menggunakan tanaman obat untuk mengatasi masalah kesehatan dan mangrove merupakan salah satu jenis tanaman yang sering digunakan [4].

Mangrove merupakan tanaman unik yang mampu beradaptadi dalam lingkungan ekstrim seperti kadar oksigen rendah, salinitas tinggi, dan suhu yang ekstim. Dengan kemampuan adaptasinya tumbuhan mangrove mensintesis beragam metabolit sekunder untuk bertahan dalam kondisi ekstrim tersebut. Beberapa bagian dari tumbuhan mangrove seperti daun, akar, batang, dan kulit kayu secara tradisional banyak digunakan dalam pengobatan. Selain itu banyak penelitian etnomedice melaporkan tumbuhan mangro potensial digunakan dalam pengobatan berbagai penyakit. Tumbuhan mangrove digunakan terutama dalam pengobatan diabetes, hipertensi, analgetik, anti inflamasi, antimikroba dan gangguan pencernaan (sembelit, diare, disentri, dispepsia, hematuria, dan sakit perut). Berdasarkan survey yang dilakukan oleh Global Forest Resources Assessment penggunaan tumbuhan mangrove untuk pengobatan secara tradisoinal wilayah asia seperti berikut India (45,8 %), Bangladesh (5,1 %), Malaysia (5,1 %), China (5,1 %), Indonesia (3,4 %), Filipina (3,4 %), Vietnam (2 %), Jepang (2 %) dan negara lainnya sebanyak 16,9 %. Data di atas dihitung bedasarkan prosentase pengguanaan tumbuhan mangrove dalam pengobatan tradisonal terhadap keseluruhan jumalan penduduk [1]. Data secara keseluruhan dapat dilihat pada gambar 2.



Gambar 2. Penggunaan Tumbuhan Mangrove Sebagai Obat Tradisional Di Asia

Di Indonesia terdapat 202 jenis tumbuhan mangrove yang terdiri dari 89 jenis mangrove pohon, 5 jenis mangrove plam, 19 jenis liana 44 jenis mangrove herba, 44 jenis epifit dan 1 jenis mangrove paku. Dari 202 jenis tumbuhan mangrove yang ada tersebar di pulau besar maupun kecil. Di pulau jawa terdapat 166 jenis mangrove, pulau Sumatra terdapat 157 jenis, Pulau Kalimantan 150 jenis, di Papua terdapat 142 jenis, Maluku terdapat 133 jenis dan kepulauan Nusa Tenggara terdapat 120 jenis. Dari 202 jenis magro tersebut terdapat 43 jenis merupakan mangrove sejati dan sisanya merupakan mangrove asosiasi. Dari 43 jenis mangrove sejatiter terdapat 33 jenis yang merupakan jenis berhabitus pohon dan semak [5]. Perserbaran tumbuhan mangrove di Indonesia sebagaiamana disajikan pada tabel 1.

Tabel 1. Persebaran Tumbuhan angrove di pulau utama di Indonesia

No	Jenis	Jawa	Bali	Sumatra	Kalimantan	Sulawesi	Maluku	Papua
1	*Aegiceras corniculatum*	+	+	+	+	+	+	+
2	*Aegiceras rotundifolia*	-	+	-	-	+	+	+
3	*Avicennia alba*	+	+	+	+	+	+	+
4	*Avicennia lanata*	-	-	-	+	+	-	-
5	*Avicennia marina*	+	+	+	+	+	+	+
6	*Avicennia officinalis*	+	+	+	+	+	+	+
7	*Bruguiera cylindrical*	+	+	+	+	+	+	+
8	*Bruguiera gymnorrhiza*	+	+	+	+	+	+	+
9	*Bruguiera parviflora*	+	+	+	+	+	+	+
10	*Bruguiera sexangula*	+	+	+	-	+	+	+
11	*Ceriops decandra*	+	+	+	+	+	+	+
12	*Ceriops tagal*	+	+	+	+	+	+	+
13	*Dolichandrone spathacea*	+	-	-	-	-	+	-
14	*Excoecaria agallocha*	+	+	+	+	+	+	+
15	*Heritiera littoralis*	+	+	+	+	+	+	+
16	*Kandelia candel*	-	-	+	+	-	-	-
17	*Lumnitzera littorea*	+	+	+	+	+	+	+
18	*Lumnitzera racemosa*	+	+	+	+	+	-	+
19	*Nypa fruticans*	+	+	+	+	+	+	+
20	*Osbornea octodonta*	+	+	-	-	+	+	+
21	*Phoenix paludosa*	-	-	+	-	-	-	-
22	*Pemphis acidula*	+	+	-	-	-	-	+
23	*Rhizophora apiculata*	+	+	+	+	+	+	+
24	*Rhizophora lamarckii*	-	+	+	-	-	+	+
25	*Rhizophora mucronate*	+	+	+	+	+	+	+
26	*Rhizophora stylosa*	+	+	+	+	+	+	+
27	*Scyphiphora hydrophyllacea*	+	+	+	+	+	+	+
28	*Sonneratia alba*	+	+	+	+	+	+	+
29	*Sonneratia caseolaris*	+	+	+	+	+	+	+
30	*Sonneratia ovate*	+	-	+	+	+	+	+
31	*Xylocarpus granatum*	+	+	+	+	+	+	+
32	*Xylocarpus moluccensis*	+	+	+	+	+	+	+
33	*Xylocarpus rumphii*	+	+	-	-	-	+	+

PEMBAHASAN

Secara tradisional di seluruh tumbuhan mangrove banyak digunakan dalam pengobatan penyakit seperti penyakit kulit, rematik, artritis, perdarahan, asma, infeksi jamur, rematik, diabetes, hipertensi, dan gangguan pencernaan seperti sembelit, diare, disentri, dispepsia, hematuria, sakit perut dan lain sebagainya [6]. Kandungan fitokimia secara umum pada tumbuhan mangrove meliputi alkaloid, karotenoid, alkohol alifatik, asam amino, asam lemak bebas, karbohidrat, hidrokarbon, feromon, lipid, steroid, terpenoid, flavonoid, saponin, tanin dan fenolik [7].

Aegiceras corniculatum merupakan spesies tumbuhan mangrove yang sering digunakan untuk racun ikan. *Aegiceras corniculatum* memiliki kandungan metabolit sekunder yang terdiri dari alkaloid, tanin, polyfenol, sterol, triterpenoid, saponin, flavonoid, hidroquinon, benzoquinon, sitostrerol, stigmasterol, asam galat. Embelin dan aegericin merupakan senyawa khas yang senyawa berhasil di isolasi dari *Aegiceras corniculatum* [8]. Embelin dalam *Aegiceras corniculatum* telah dilaporkan memiliki

banyak efek farmakologis termasuk antifertilitas, analgesik, anti-inflamasi, antioksidan, antidiabetik, hepatoprotektif, antikonvulsan, ansiolitik, dan aktivitas antimikroba [9].

Ghosh et al., 2017 melaporkan metabolit sekunder yang terkandung dalam *Aegialitis rotundifolia* meliputi Gallic acid, chlorogenic acid,caffeic acid, p-coumaric acid,rutin, coumarin, quercetin. Daun dan kulit batang Aegialitis rotundifolia digunakan sebagai analgesik, analgetik, antiinflamasi, antiacne, antirepelen, antipiretik, antioksidan, anti mikroba, trombolitik, anti bakteri dan anti kanker [10].

Spesies *Avicennia* mempunya beragam khasiat pengobatan seperti pada penyakit HIV, kanker, hepatitis diare, diabetes, peradangan, penyakit terkait stres oksidatif, dan lain-lain [11]. Daun dan batang Avicennia alba mengandung karbohidrat, tanin, steroid, terpenoid, saponin, flavanoids, alkaloid. Resin *Avicennia alba* digunakan untuk membantu proses kelahiran, pengobatan bisul, obat penyakit kulit dan digunakan dalam pengobatan tumor [12]. Das et al., 2015 melaporkan *Avicennia alba* melaporkan ada beberapa senyawa metabolit yang berhasil di isolasi di antaranya Naphthoquinoline, Avicequinon,Friedlein, Phytosterols, 1-Triacontanol, avicenol-A, Avicenol, Phytoalexin. Senyawa Naphthoquinoline, Avicequinon potesial digunakan sebagai anti cancer [13].

Bruguiera cylindrica secara fitokimia terbukti mengandung senyawa metabilit sekunder berupa alkaloid, flavonoid, tanin, saponin, triterpen dan antrakuinon. Flavonoid (rutin, isovitexin, vitexin, isoorientin), triterpinoid (asam ursolat dan 2a, 3a, 23-trihydroxyurs-12-en-28-oic acid) dan tanin (punicalagin, punicalin, terflavin A dan B, tergallagin, tercatain, asam chebulagic, geranin, granatin B, corilagin) [14]. Seluruh bagian tumbuhan Bruguiera cylindrica secara tradisional digunakan untuk mengobati hepatitis, pengobatan gangguan hati, penyakit kuning, diabetes, hipertensi, bisul, menghentikan perdarahan dan anti inflamasi [15]. Buah dapat digunakan untuk menghentikan perdarahan dan daunnya digunakan untuk menurunkan tekanan darah, mempercepat penyembuhan luka, luka bakar, anti-inflamasi dan artritis rheumatoid [16].

Excoecaria agallocha terindikasi mengandung golongan senyawa polifenol, saponin, alkaloid, tanin, karotenoid, chalcones, cyclitol, racun excoecaria, fluratoxin, gliserida asam lemak, lipid, phorbol ester, polisakarida, protein, gula, steroid, diterpen, triterpen, sitosporon B dan C dan fomopsin A, B, C [17][18]. Getah *Excoecaria agallocha* merupakan pengiritasi kuat pada kulit, selaput lendir dan mata sehingga dapat membuat buta sementara jika terkena mata karena mengadung ekskoekariatoksin [19]. Excoecariphenol D, corilagin, geraniin, dan chebulagic acid menunjukkan potensi penghambatan terhadap protease HCV NS3-4A dengan nilai IC_{50} pada kisaran 3,45-9,03μM, sedangkan excoecariphenol D dan corilagin menghambat HCV RNA di 7,5 sel secara signifikan [20].

Heritiera littoralis sering digunakan dalam pengobatan diare, disentri, sakit perut, hematuria dan untuk mengendalikan nyamuk. Rebusan daun digunakan sebagai pengobatan sakit gigi dan infeksi mulut [21]. Daun *Heritiera littoralis* mengandung flavonoid (quercitrin, quercetin, kaempferol, kaempferitrin, myricetin, eriodictyol, afzelin, astragalin, tribuloside, dan catechin dan lignin. Kulit batang mengandung kumarin, proanthocyanidin, terpenoid, steroid, tanin dan antraquinon. Akar mengandung sesquiterpen, terpenoid, astilbin. Sesquiterpenes dari akar Heritiera littoralis heritol, heritonin, heritianin, vallapin, vallapianin. Senyawa tribuloside dan astilbin menunjukkan aktivitas penangkapan radikal 1,1-difenil-2-pikrilhidrazil selain itu sebagai obat anti-tuberkulosis. Senyawa friedelin dari ekstrak diklormetan menunjukkan aktivitas antimikobakteri terhadap spesies Mycobacterium non-patogen, Mycobacterium madagascariense dan Mycobacterium indicus pranii, dengan konsentrasi hambat minimum (MIC) 5,0 mg/mL [22].

Basyuni et al., 2019 melaporkan ekstak etanol daun dan akar *Kandelia candel* mengandung senyawa Campesterol, α-amyrin, Lupenone, β-amyrin, Lanosterol, Lupeol, Cycloartenol. Kandenol. Taraxerol, α-amyrin, β-amyrin, lupeol dan germanicol berpotensi sebagai anti inflamsi dengan menghambatan produksi TNF-α. Aktivitas anti-karsinogenik untuk taraxerol dan germanicol, sifat insektisida untuk taraxerol, dampak

kardioprotektif pada sindrom hiperkolesterolemia untuk lupeol, kontra hepatoprotektif terhadap hepatotoksisitas yang diinduksi asetaminofen untuk α dan β-amyrin [23].

Rhizophora apiculata mengandung senyawa golongan alkaloid, flavonoid, fenol, saponin, steroid dan terpenoid [24]. Ekstrak etanol batang *Rhizophora apiculata* mengandung lyoniresinol-3α-O-β-arabinopyranoside, lyoniresinol-3α-O-β-rhamnoside, dan afzelechin-3-O-L-rhamno-pyranoside yang mempunyai aktivitas sebagai antioksidan yang diuji dengan metode DPPH dan ABTS[25]. Selain itu senyawa tannin terkondensasi (catechin dan epicatechin) berpotentesi sebagai anti bakteri terhadap Acinetobacter calcoaticus, Klebsiella pneumoniae, Bacillus subtilis, B. licheniformis, Staphylococcus aureus, S. epidermidis, B. cereus, Serratia marcescens, Erwinia sp. dan Pseudomonas aeruginosa [26].

Rhizophora mucronata mengandung senyawa golongan fenol, tanin, flavonoid, saponin, glukosida, terpenoid, dan alkaloid [27]. Seluruh bagian *Rhizophora mucronata* digunakan dalam pengobatan diabetes, diare, disentri, kaki gajah, hematoma, bisul, disentri, demam, angina, hematuria, perdarahan, hepatitis, radang, luka dan bisul [28]. Orang Melayu menggunakan daun dan akar untuk membantu dalam proses melahirkan. Di Papua New Guine batang Rhizophora mucronata digunakan untuk sembelit, meningkatkan kesuburan, dan gangguan haid [27].

Sonneratia alba mengandung senyawa metabolite sekunder golongan alkaloid, fenolik, tanin, saponin dan flavonoid. Selain itu ekstrak metanol daun sonneratia alba juga mengandung Lupeol, Oleanic acid, alfa-Sitosterol, alfa-stigmasterol dan Sitost-4-en-3-one [29]. Buah matang *Sonneratia alba* digunakan untuk mengusir parasit usus sedangkan buah setengah matang biasanya digunakan untuk pengobatan batuk, tapal pada bengkak dan keseleo [30].

Sonneratia caseolaris atau sering disebut dengan mangrove apel teridentifikasi megandung metabolit sekunder diantaranya saponin, flavanoid, triterpenoid, steroid, fenol, terpenoid, glikosida, tanin dan tidak adanya alkaloid, steroid [31]. Flavonoidyang terkandung dalam *Sonneratia caseolaris* terdiri dari luteolin dan luteolin 7 β glukosidase [32]. Sedangkan senyawa sterol yang terkandung dalam buah *Sonneratia caseolaris* terdiri dari stigmasta-5-ene--3-ol, oleanolic acid, β-sistosterol-β-D-glucopyranoside, maslinic acid dan luteolin. Senyawa luteolin dan oleanolic acid berpotensi sebagai anti hiperglikemia dengan nilai IC_{50} sebesar 15 μM [33]. Sedangkan luteolin dan luteolin glikosida dan menunjukkan penghambatan nonkompetitif parsial pada aktivitas asetilkolinesterase [34].

Senyawa golongan flavonoid, alkaloid, asam fenolat, steroid, monoterpen, triterpenoid, tetratriterpenoid dan limonoid terdapat pada daun, batang, kulit kayu dan buah *Xylocarpus granatum* [35]. Senyawa alkaloid yang terdapat dalam Xylocarpus granatum meliputi asacetonyl dihydrochelerythrine, N-methyl flindersine, chelerythrine dan dihydrochelerythrine yang berhasil diisolasi dari kulit akar. Selain itu senyawa gedunin, prosianidin, katesin, limonoid, fotogedunin, xyloccensin, , mexicanolide, phragmalin, cipadesin, xylocarpins, xylogranatin xylocartin juga berhasil di isolasi dari daun *Xylocarpus* granatum [36]. Di India seluruh bagian *Xylocarpus granatum* digunakan sebagai astringent, penurun panas, malaria, sariawan, kolera, disentri, diare dan anti hiperlipidemia [36]. Senyawa limonoid dalam Xylocarpus granatum digunakan sebagai anti diare, anti bakteri, anti filaria, sitotoksik, anti ulkus, antidiabetes, anti dislipidemia dan kardiotonik [37]. Kandungan kimia dan penggunaan tumbuhan mangrove yang ada di Indonesia sebagaimana disajikan pada tabel 2.

Tabel 2. Kandungan Kimia, Penggunaan, dan Aktivitas Farmakologi Tumbuhan Mangrove Di Indonesia

No	Mangrove	Senyawa Bioaktif	Kegunaan Untuk Pengobatan
1	*Aegiceras corniculatum*	Benzoquinones embelin, aegicerin, 5-O-methyl embelin, 2,5-didehydroxy-6-	Anti asma, anti artritis, antidiabetes, analgesik, anti

		methylembelin, 4-hydroxy-2-methoxybenzamide, 5-O-ethylembelin, 4-methoxy resorcinol [38], Emerimidine A dan B, protoprimulagenin, isorhamnetin [12]	inflamasi, sitotoksik, hepatoprotektif, anti hiperglikemik dan anti diare[38]
2	*Aegiceras rotundifolia*	Gallic acid, chlorogenic acid,caffeic acid, p-coumaric acid,rutin, coumarin, quercetin [39]	Analgesik, anti inflamasi, antiacne, anti repelen, anti piretik, anti oksidan, anti mikroba, trombolitik, anti bakteri, anti piretik dan anti kanker [40]
3	*Avicennia alba*	Naphthoquinoline, Avicequinon,Friedlein [13], Phytosterols, 1-Triacontanol, avicenol-A, Avicenol, Phytoalexin [43]	Bisul, penyakit kulit, kontrasepsi, gigitan ular, analgesik, antipiretik, anti inflamasi, anti ulkus, hepatoprotektif, anti diare, estrogenik, anti fertilitas, paralisis, kudis, reumatik, afrodisiak, asma, gangguan seksual dan anti bakteri [11] [12]
4	*Avicennia lanata*	Ursolat, lupeol, betulin, sitosterol, sitosterol 3–O–β–D–glukopiranosida, dan tektokrisin, Hydroxyavicenol, glycosemiquinone, avicenol, glycoquinone, taraxerone [49].	Anti kanker, menurunkan kolesterol, anti inflamasi, dan antiulcer [50]
5	*Avicennia marina*	Luteolin 7-O-methylether, chrysoeriol 7-oglucoside, Lapachol, avicennone, avicenol, stenocarpoquinone, lyoniresinol, taraxerone, stigmasterol-3-O-β-d-galactopyranoside, mussaenoside [52] [12]	Maag, pengobatan rematik, cacar, penyakit kulit, sakit tenggorokan, anti hiperglikemik, anti oksidan, aborsi dan luka bakar [53][54]
6	*Avicennia officinalis*	Rhizoporin, excoecarin, Betulinic acid, lupeol, Betulinaldehyde, C iridoid glukosida, 7-O-trans cinnamoyl-4-epilogenin, asamgeniposidic, 2-cinnamoyl-mussaenoside [59]	Cacar, nyeri sendi, gangguan saluran kencing, asma bronkial, gangguan lambung, hepatitis, kusta, afrodisiak, diuretik, pematangan bisul, kudis, kontrasepsi, rematik, paralisis, anti mikroba, analgesik, anti nociceptive, anti inflamasi, antikanker dan antioksidan [60]
7	*Bruguiera cylindrica*	Pimaranes, Brugierol E-feruloyltaraxerol , Z-feruloyltaraxerol,E-coumaroyltaraxerol, 3α-E-coumaroyllupeol, 3α-Z-coumaroyllupeol, dan 3α-E-caffeoyltaraxerol [64] [65]	Hepatitis, gangguan hati, penyakit kuning, diabetes, tekanan darah, bisul, mempercepat penyembuhan luka, luka bakar, artritis reumatoid dan anti inflamasi [16]
8	*Bruguiera gymnoriza*	Rhyncosides A–D, alkaloids brugine, 1,2-dithiolane, lupeol, lupeone, trans-hydroxy-cinnamoyl ester, taraxerone, β-amyril-palmitate, squalene,β-sitosterol, sexangulic acid,daucosterol dan 7α-hydroxy-sitosterol [67] [64].	Diare, sembelit, luka bakar, anti hiperglikemik, anti diare, analgesik, anti oksidan, anti inflamasi, anti diabetik, nyeri, gangguan hati, demam, herpes zoster, penyakit mata, malaria, dan abortifacient [68] [69]
9	*Bruguiera sexagula*	Gymnorrhizol, Pimaranes, Brugierol, Steviol Bruguierol A–C, bruguiesulfurol, isobrugierol, gibberellin, Cholesterol, campesterol, stigmasterol, 28-isofucosterol [67] [64]	Diabetes, herpes, dan luka bakar [69]
10	*Bruguiera*	Dioslupecin, lupenone. Lupeol,caffeoyl	Diabetes, sakit perut, sakit mata,

	parviflora	ester, 3-(Z)-caffeoyllupeol, lupeol caffeate, 3-(Z)-coumaroyllupeol, dioslupecin A [74]	herpes zoster dan luka bakar [69]
11	*Ceriops decandra*	Ceriopsin F, steviol, decandrin, pinoresinol, lupeol, -amyrin, asam oleanolic, asamursolat, catechin, procyanidins, asam 3β-E-coumaroylbetulinic, ester lupeol, asambetulonic, betulin, betulinic acid, lupenone, 3β-E-feruloyllupeoldan 3β-Z-feruloyllupeol [76] [77]	Anti virus, anti bakteri, anti oksidan, anti angina, diabetes, diare, disentri, perawatan luka, bisul, hepatitis, hepatoprotektor, astringen, anti perdarahan, nyeri dan maag [78]
12	*Ceriops tagal*	Tagalsin, lupane, abietane, betulin, ent-5alpha-dolabr-4-ene-15S,16-diol, squalene, betulinic acid, beta-sitosterol, n-hexacosanylferulate, 3-epi-butulinic acid, 3-epi-acetylbetulinic acid, caffeic acid dan 5,7,3′,4′-tetrahydroxyflavonol [81] [82]	Penyakit kulit, haemoragi, anti bakteri, anti fouling, anti feedant, anti hiperglikemik, penghambat α-glukosidase dan sitotoksik [83]
13	*Excoecaria agallocha*	Exoecarin, phaeophytin A, betulin, afzelin, Quercitrin, Stachenone, stachenol, excoecariatoxin, daphnane, Excolides, Excoecariphenol [87] [67]	Pengobatan epilepsi, maag, kusta, rematik, uterotonik, konjungtivitis, dermatitis, hematuria, kusta, sakit gigi, paralisis, abortifacient, pencahar, flatulen, afrodisiak, anti oksidan, anti bakteri, anti virus, anti-diabetes, anti kanker, anti-inflamasi, analgesik, obat penenang, anti-alergi dan anti-hiperglikemik [20] [88]
14	*Heritiera littoralis*	tribuloside, astilbin, afzelin, 3,5,7-trihydroxychromone-3-O-Lrhamnopyranoside, quercetin-3-O-L-rhamnopyranoside, dihydroquercetin-3-O-L-rhamnopyranoside, kaempferol-3-O-L-rhamnopyranoside [22] [21]	Anti diare, disentri, sakit perut, hematuria, sakit gigi, infeksi mulut dan anti repelen [21]
15	*Kandelia candel*	Campesterol, α-amyrin, Lupenone, β-amyrin, Lanosterol, Lupeol, Cycloartenol. Kandenol [23] [92]	Penyakit kardiovaskular, kanker, gangguan neurodegeneratif, anti diabetes, anti hiperglikemik, anti virus dan anti mikroba [1] [93]
16	*Lumnitzera racemosa*	Lumniracemoside, emodin, taraxerol, betulin, β-sitosterol, triacontanol, corilagin, Myrcetin 3-O-Methyl Glucuronate [95]	Pengobatan gigitan ular, reumatik, alergi kulit, pembersih darah, asma, anti fertilitas, diabetes, pruritus kulit, herpes, kudis, dan sariawan [96]
17	*Nypa fruticans*	hydroxybenzoic acid, chlorogenic acid, rutin, cinnamic acid, quercetin, kaempferol, Gallic acid, protocatechuic acid, 4-hydroxybenzoic acid, chlorogenic acid, rutin, cinnamic acid, dan quercetin [99] [100]	Asma, kusta, TBC, sakit tenggorokan, penyakit lever, gigitan ular, sebagai pereda nyeri, obat penenang, anti diabetes, analgesik dan karminatif [101]
18	*Rhizophora apiculata*	lyoniresinol-3α-O-β-arabinopyranoside, lyoniresinol-3α-O-β-rhamnoside, dan afzelechin-3-O-L-rhamno-pyranoside, Dunnianoside E, Dihydroquercetin, 2,6-Dimethoxy-[1,4]benzoquinone, 2,4,6-Trimethoxyphenol, dan Methyl 3,4-dihydroxycinnamate [25] [102]	Astringent, diare, mual, muntah, antiseptik, anti haemorragic, obat demam tifoid, diabetes dan hepatitis [103]
19	*Rhizophora lamarckii*	taraxerone, taraxerol, β-sitosterol, careaborin, cis-careaborin, β-daucosterol, isovanillic acid,	Alzhaimer, hepatitis [107]

		protocatechuic acid, astilbin rutin, epicatechin, 3-O-acetyl, afzelechin, cinchonain, Rhizostyloside [106]	
20	*Rhizophora mucronata*	Xanthone, lichixanthone, atranorin, α-amyrin, β-amyrin, Palmitone, β-sitosterol, dimyristyl ketone, β-sitosterol glycoside, Rhizophorin A, rhizophorin B, rhizophorin C-E [108] [109]	Diabetes, diare, hepatitis, radang, luka, bisul, pengobatan kaki gajah, hematoma, hepatitis, obat penurun panas, hematuria, disentri, memperlancar kelahiran, sembelit, meningkatkan kesuburan, dan gangguan haid [110] [109]
21	*Rhizophora stylosa*	taraxerone, taraxerol, β-sitosterol, careaborin, cis-careaborin, β-daucosterol, isovanillic acid, protocatechuic acid, astilbin rutin, epicatechin, 3-O-acetyl, afzelechin,cinchonain, Rhizostyloside, isolariciresinol, polystachyol,pinoresinol, blumenol daan kaempferol 3-rutinoside [116] [117]	Anti diabetes dan hematuria [118]
22	*Sonneratia alba*	ursolic acid, α-amyrin cinnamate, β-amyrin cinnamate, β-sitosterol, stigmasterol, lupeol, squalene, lupan-3p-ol, lupine [121] [122]	Anti parasit, batuk, bengkak, keseleo [30]
23	*Sonneratia caseolaris*	Luteolin, luteolin 7 β glukosidase, stigmasta-5-ene--3-ol,oleanolic acid, β-sistosterol-β-D-glucopyranoside, maslinic acid [125] [33]	Keseleo, bengkak, cacing, batuk, anti alergi, repelen, hematuria, mempercepat penyembuhan luka, memar, astringent, antiseptik, menghentikan perdarahan, wasir, anti diabetes dan cacar [126] [127]
24	*Xylocarpus granatum*	Gedunin, Prosianidin, katesin, limonoid, fotogedunin, xyloccensin, Xylomexicanins, Andirobin, mexicanolide, phragmalin, cipadesin, xylocarpins, xylogranatin xylocartin [132] [36]	Astringent, obat penurun panas, malaria, sariawan, kolera, disentri, diare, anti diabetes, anti inflamasi dan anti dislipidaemik [133] [134]
25	*Xylocarpus moluccensis*	limnoid, xyloccensin, xylomexicanins, katekin, epikatekin, procyanidins, swietemahonolide, febrifugin, khayasin T, febrifugin A, gedunin, isolariciresinol, asam faseat, aromadendrin, asam 4-hidroksi sinamat, asam 4-hidroksibenzoat, asam 4-hidroksifenilasetat, dan xylogranatinin [137] [138]	Demam, sakit kepala, kelelahan, nyeri, afrodisiak, scabies, konstipasi, malaria, kandidiasis, astingen, kolera, kaki gajah, diare, disentri, hiperglikemia, dislipidemia dan pembengkakan pada payudara [138] [139]

4. Kesimpulan

Spesies tumbuhan mangrove tersebut tersebar di seluruh pulau di Indonesia meliputi Jawa, Bali Sumatra, kalimantan, Sulawesi, Maluku dan Papua. Seluruh bagian (Daun, batang, kulit, akar, buah dan bunga) tumbuhan secara tradisional dapat digunakan untuk pengobatan berbagai penyakit meliputi : analgetik, antipiretika, antidiabetes, smal pox, bisul, gangguan gastro intestinal, anti inflamasi, anti oksidan, anti reumatik, penyakit kulit, antiseptik, anti bakteri, anti virus, kontrasepsi, obat batuk, gigitan ular, anti filariasis, paralisis, luka bakar, hepatoprotektor, diuretiaka dan lain-lain dengan kandungan metabolit

sekunder secara garis besar meliputi senyawa golongan alkaloid, terpenoid, flavonoid, steroid, glukosida, tanin saponin dan lain-lain.

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