A Short Review on Phytoconstituents from the Genera Albizia and Erythrina

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Abstract

The genus Albizia and Erythrina are the leading sources of phytoconstituents. The aim of this review is to solicit the phytoconstituents from some medicinal plants. A total nine medicinal plants were studied and 121 chemical constituents along with structures have been reported here. Erythrina burttii consists of highest number of constituents.

Key words: Medicinal plant, Phytoconstituents, Flavonoids, Isoflavanones, Saponins, Sesquiterpenes, Flavan, Steroid, and Triterpenoids.

Introduction

Nature is a great source of medicinal plants and these plants are used as a traditional medicine for many years (Hussain et al., 2010). One hundred and ten species are present as trees and shrubs in the genus Erythrina (Hussain et al., 2016a, 2011). Among them, two species have been reviewed comprehensively in this review. E. burttii is a flowering and flat-topped tree (height: 3.5-18 m) growing in Ethiopia, Kenya, and Tanzania. E. droogmansiana is a single straight stem, soft wood and rounded crown tree (height: 20 m) extensively grown in Congo, Cameroon and Gabon, and used in the treatment of fever, hemorrhoids, and wound infection in locally. The genus Albizia consists of 150 species extensively distributed in Africa, Asia, and South America. Albizia species were used as traditional medicine in the treatment of anthelmintic, cough, diarrhea, insomnia, irritability, injuries, poor memories, rheumatism, scabies, stomach trouble, and wounds in Africa and China (Hussain et al., 2016b). A. anthelmintica is a medium canopied tree (height: 8 m) with soft bark and unwrap spine. A. lebbeck (Leguminosae) is an exposed deciduous tree (height: 12-21 m) that grows in over Bangladesh (Hussain et al., 2008). A. inundata is a perennial tree and found in Argentina. A. glaberrima is a big tree having few flattened crown and used as a folk medicine in the treatment of anemia, bilharzias, epilepsy, and liver complications in Cameroon and Nigeria. A. coriaria is a medicinal plant found in Uganda and used in the treatment eye diseases, jaundice, skin disease, sore throats, and syphilis. C. zeyheri (Family: Combretaceae) is a Tanzanian medicinal plant and applied for the management of different health consequences such as cancer, cough diarrhea, hypertension, and snakebite.

Reported phytoconstituents

A total nine medicinal plants have been studied and one hundred and twenty one (1-121) compounds were reported in this review as phytoconstituents. The studied medicinal plants are Erythrina burttii, E. droogmansiana, Albizia submidaata, A. anthelmintica, A. inundata, Spergularia marginata, Manikara rufula, A. lebbeck, Ainsliaea yunnanensis, A. glaberrima, Combretum zeyheri, A. boromoensis, A. grandibracteata, and A. coriaria.

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**Flavonoids**

*Erythrina* genus is a pioneer source of flavonoids. There are twenty four phytoconstituents have been reported as flavonoids and pilocarpin from *Erythrina burttii* such as Burttinol A (1), Burttinol-A diacetate (2), Burttinol B (3), Burttinol-B acetate (4), Burttinol C (5), Burttinol-C diacetate (6), Eryvarin H (7), Eryvarin-H diacetate (8), Burttinol D (9), Burttinol-D diacetae (10), 4-O-methylsigmoidin B (11), Abyssinone V (12), Abyssinone V methyl ether (13), Calopocarpin (14), Burttinne (15), Neurautenol (16), Bidwillon (17), Isobavachalcone (18), Erythrinasinate (19), 7-O-methyluteone (20), Burttinonedehydrate (21), 8-Prenylluteone (22), 3-O-methylcalopocarpin (23), and genistein (24) (Figure 1) (Yenesew et al., 2012, 1998, 2003).

![Flavonoids from Erythrina burttii.](image)
**Isoflavanones**

The genus *Erythrina* (Family: Leguminosae) is a renowned source of isoflavonones and alkaloids. Ten isoflavonones were reported from the root bark of *Erythrina droogmansiana* for example 7,4'-Dihydroxy-2'-methoxy-3'-(3-methylbut-2-enyl)-isoflavanone (25), Sophoraisoflavanone A (26), Erypoegin D (27), Trihydroxy-8-(3-methylbut-2-enyl)-[6",6"-dimethyl-pyran(2",3", 4",5")]-isoflavone (28), Isolupalbigenin (29), 5,7,2',4'-Tertahydroxy-8,5'-di-(3-methylbut-2-enyl)-isoflavone (30), Erypyrene (31), Phaseollidin (32), Cristacarpin (33), and Erystagallin A (34) (Figure 2) (Bedane et al., 2017).

![Figure 2. Isoflavanones from *Erythrina droogmansiana*.](image)

**Saponins**

*Albizia subdimidiata*, *A. anthelmintica*, *A. inundata*, *Spergularia marginata*, and *Manilkara rufulae* are the key source of saponins. The reported saponins from these plants are 3-O-D-Xylopyranosyl-(1→2)-L-arabinopyranosyl-(1→6)-2-acetamido-2-deoxy-D-glucopyra-nosyl-oleanolic acid (35), 3-O-D-Xylopyra-nosyl-(1→2)-L-arabinopyranosyl-(1→6)-2-acetamido-2-deoxy-D-glucopyranosyl oleanolic acid peracetate (36), 3-O-L-Arabinopyra-nosyl-(1→2)-L-arabinopyr-anosyl-(1→6)-2-acetamido-2-deoxy-D-glucopyranosyl-oleanolic acid (37), 3-O-L-Arabinopyra-nosyl-(1→2)-L-arabinopyra-nosyl-(1→6)-2-acetamido-2-deoxy-D-glucopyranosyl oleanolic acid peracetate (38), 3-O-L-Arabinopyra-nosyl-(1→6)-2-acetamido-2-deoxy-D-glucopyra-nosyl-oleanolic acid (39), 3-O-2-Acetamido-2-deoxy-D-glucopyranosyl-oleanolic acid (40), O-Methyl-cyclitol (41), 3-O-[α-L-Arabinopyranosyl-(1→6)]-2-acetamido-2-deoxy-β-
D-glucopyra-nosyl-oleanolic acid (42), 3-O-[α-L-Arabinopyra-nosyl-(1→6)]-2-acetamido-2-deoxy-β-D-glucopyra-nosyl-echinocystic acid (43), 3-O-[α-L-Arabinopyra-nosyl-(1→2)-α-L-arabinopyra-nosyl-(1→6)]-2-acetamido-2-deoxy-β-D-glucopyra-nosyl-echinocystic acid lactone (44), 3-O-[β-D-xylopyranosyl-(1→2)-α-L-arabinopyra-nosyl-(1→6)]-2-acetamido-2-deoxy-β-D-glucopyra-nosyl-echinocystic acid (1→6)]-2-acetamido-2-deoxy-β-D-glucopyra-nosyl-echinocystic acid (52), 3-O-[α-L-Arabinopyra-nosyl-(1→6)]-2-acetamido-2-deoxy-β-D-glucopyra-nosyl-echinocystic acid (53), 3-O-β-D-glucuronopyra-nosyl-echinocystic acid 28-O-α-L-arabinopyra-nosyl-(1→2)-α-L-rhamnopyra-nosyl-(1→3)-β-D-xylopyra-nosyl-(1→4)-α-L-rhamnopyra-nosyl-(1→2)-α-L-arabinopyra-nosyl ester (54), 3-O-β-D-glucopyra-nosyl-(1→3)-β-D-glucuronopyra-nosyl echinocystic acid 28-O-α-L-arabinopyra-nosyl-(1→2)-α-L-rhamnopyra-nosyl-(1→3)-β-D-xylopyra-nosyl-(1→4)-α-L-rhamnopyra-nosyl-(1→2)-α-L-arabinopyra-nosyl ester (55), 3-O-β-D-glucopyra-nosyl-(1→4)-3-O-sulfate-β-D-glucuronopyra-nosyl echinocystic acid 28-O-α-L-arabinopyra-nosyl-(1→2)-α-L-rhamnopyra-nosyl-(1→3)-β-D-xylopyra-nosyl-(1→4)-α-L-rhamnopyra-nosyl-(1→2)-α-L-arabinopyra-nosyl ester (56), 3-O-β-D-glucopyra-nosyl-(1→4)-β-D-glucuronopyra-nosyl-21-O-acetyl acacic acid (57), and Mi-saponin C (58) (Figure 3) (Kader et al., 2001; Runyoro et al., 2015; Zhang et al., 2011; Carpani et al., 1989; Pertuit et al., 2017; Vieira et al., 2017).
Figure 3. Reported saponins from medicinal plants.
Sesquiterpenes

Aromatic medicinal plant Albizzai lebbeck and Ainsliaea yunnanensis are the principle source of sesquiterpenes. The elucidated sesquiterpenes from these plant are Benzyl-1-O-β-D-glucopyranosidem (59), Benzyl-6-O-α-L-arabinopyra-nosyl-β-D-glucopyranoside (60), Linalyl-β-D-glucopyranoside (61), Linalyl-6-O-α-L-arabinopyranosyl-β-D-glucopyranoside (62), (2E)-3,7-Dimethylcta-2,6-dienoate-6-O-α-L-arabinopyranosyl-β-D-glucopyranoside (63), Glycoside1-O-[6-O-α-L-arabinopyranosyl-β-D-glucopyranoside]-[2E, 6E]-farnesol (64), n-Hexyl-α-L-arabinopyranosyl-(1→6)-β-D-glucopyranoside (65), n-Octyl-α-L-arabinopyranosyl-(1→6)-β-D-glucopyranoside (66), 2,3-Dihydroxy-2,3-dihydrofuranoside (67), Ethyl fructofuranoside (68), Yunnanolides A (69), Yunnanolides B (70), Yunnanolides C (71), Yunnanolides D (72), Yunnanolides E (73), Yunnanolides F (74), Yunnanolide G (75), Yunnanolides H (76), Yunnanolides I (77), Pertyolide C (78), Diaspanolide A (79), Diaspanolide B (80), 1a-Hydroxy-3-O-isovalerate zaluzanin C (81), Tetrahydrodehydrozaluzanin C (82), Dihydrozaluzanin C (83), Zaluzanin C (84), Isoamberboin (85), 11b,13-Dihydro-3-epizaluznin C (86), and 4b,15,11b,13-Tetrahydrozaluzanin C (87) (Figure 4 and 5) (Massarani et al., 2016; Fang et al. 2017).

Flavan and Steroids

A bunch of flavan and steroids were isolated from the Albizzia glaberrima such as (+)-(2R,3S,4R)-3’,4’,7-trihydroxy-4-methoxy-2,3-trans-flavan-3,4-trans-diol (88), (+)-Mollisacacidin (89), (+)-Fustin (90), Butin (91), Chondrillasterol (92), and Chondrillasterone (93) (Figure 6) (Fotso et al., 2017).

Figure 4. Sesquiterpenes from A. lebbeck.
Figure 5. Isolated sesquiterpenes

Figure 6. Flavan and steroids from Albizia glaberrima.
Triterpenoids

A lots of triterpenoids have been derived from *Combretum zeyheri*, *A. glaberrima*, *A. boromoensis*, and *A. grandibracteata* for example Lupeol (94), Ursolic acid (95), Oleanolic acid (96), Maslinic acid (97), 2α,3β-Dihydroxy-urs-12-en-28-oic acid (98), 6β-Hydroxymaslinic acid (99), Terminolic acid (100), Methylsumaresinolate (101), Arjunolic acid (102), Asiatic cid (103), Glaberrimoside A (104), Glaberrimoside B (105), Glaberrimoside C (106), Boromoenoside A (107), Boromoenoside B (108), Boromoenoside C (109), Boromoenoside D (110), Gummiferaosides D (111), Gummiferaosides E (112), Julibroside J₈ (113), Grandibracteoside A (114), Grandibracteoside B (115), and Grandibracteoside C (116) (Figure 7) (Runyoro et al., 2013; Note et al., 2016, 2015; Simo et al., 2017; Krief et al., 2005).
107: \( R_1 = \text{Glc}, R_2 = \text{Glc} \)
108: \( R_1 = \text{H}, R_2 = \text{Glc (1\rightarrow6) Glc} \)
109: \( R_1 = \text{H}, R_2 = \text{H} \)
110: \( R_1 = \text{Glc}, R_2 = \text{H} \)
Figure 7. Reported triterpenoids.
**Miscellaneous**

A total six molecules for examples Lupeol (94), Lupenone (117), Betulinic acid (118), Acacic acid lactone (119), (+)-Catechin (120), and Benzyl alcohol (121) were isolated with chemical structures from *Albizzia coriaria* (Figure 8) (Byamukama et al., 2015).

**Biological properties**

The reported phytoconstituents showed lots of biological properties that are given in table 1.

![Chemical structures](image)

**Table 1. Biological properties of the reported phytoconstituents.**

<table>
<thead>
<tr>
<th>Molecules</th>
<th>Biological properties</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>DPPH free radical scavenging</td>
<td>Bedane et al., 2017</td>
</tr>
<tr>
<td>34-57</td>
<td>Cytotoxic</td>
<td>Kader et al., 2001; Runyoro et al., 2015; Zhang et al., 2011; Carpani et al., 1989; Pertuit et al., 2017</td>
</tr>
<tr>
<td>58</td>
<td>Anti-trichomonal</td>
<td>Vieira et al., 2017</td>
</tr>
<tr>
<td>69-87</td>
<td>Inhibitory effect against nitric oxide</td>
<td>Fang et al., 2017</td>
</tr>
<tr>
<td>88-93</td>
<td>Cytotoxic</td>
<td>Fotso et al., 2017</td>
</tr>
<tr>
<td>94-106</td>
<td>Anticandida and cytotoxic</td>
<td>Runyoro et al., 2013; Note et al., 2016</td>
</tr>
<tr>
<td>107-110</td>
<td>Inhibitory effect</td>
<td>Note et al., 2015</td>
</tr>
<tr>
<td>111-113</td>
<td>Pro-apoptotic activity (Cytotoxic)</td>
<td>Simo et al., 2017</td>
</tr>
<tr>
<td>114-116</td>
<td>Inhibitory activity</td>
<td>Krief et al., 2005</td>
</tr>
<tr>
<td>117-121</td>
<td>Antimicrobial</td>
<td>Byamukama et al., 2015</td>
</tr>
</tbody>
</table>

Figure 8. Miscellaneous compounds from *Albizzia coriaria*. 

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Conclusion

The molecules from nine medicinal plants have been reviewed. Structurally distinctive different compounds were obtained from these plants. Our study showed that medicinal plants can be a principle source of phytoconstituents as well as medicinal moieties.

References


