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A Mini Review on the Chemical Compounds of the Genus *Acacia*

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Abstract

The genus *Acacia* is a pioneering source of diversified chemical compounds. The purpose of this review is to compile of the phytochemicals from few species of *Acacia*. A total ten species of *Acacia* were studied and seventy six (1-76) phytoconstituents, including their chemical structures are reported in this review. The highest number of chemical compounds has been reported from *Acacia nilotica*.

Key words: *Acacia*, Mimosaceae, Leguminosae, Fabaceae, and Chemical compounds**.**

Introduction

Nature is a significant resource of medicinal plants and these plants are using as conventional agents for the treatment of various diseases from many years (Hussain 2019, 2018; Hussain *et al*., 2016a, 2016b). The medicinal plants under *Acacia* genus is bearing therapeutic properties such as anti-microbial, anti-inflammatory, anti-plasmodial, and cytotoxic activity (Billah *et al*., 2013; Hussain *et al*., 2011, 2010, 2008; Ismail *et al*., 2010). *Acacia* is a big pantropical genus comprising greater than 1300 species under the family of Mimosoideae and subfamily Fabaceae. *A. albida* (Family: Momosaceae) is a tree (24 m in height) bearing big straight bowl and rounded crown. *A. catechu* (Family: Leguminosae) is a deciduous and thorny tree grows up to 15 m in height. *A. cyclops* (Family: Fabaceae) is a small tree or coastal shrub native to Australia. *A. kamerunensis* (Family: Momosaceae) is a lowland rain secondary forest and scandent shrub (5 m tall) distributed in Sierra Leone and Uganda. *A. mearnsii* (Family: Momosaceae, black wattle) is a significant species for tannin production and woodchip factories. *A. nilotica* (Family: Fabaceae): is a thorny tree up to 15 m in height with a characteristic necklace appearance. *A. pennata* (Family: Mimosaceae) is a perpetual woody climber having bi-pennate leaves.

Chemical compounds

A total ten species of the genus *Acacia* have been studied and seventy six (**1-76**) molecules were reported in this review as phytochemicals. The studied species of *Acacia* are *Acacia albida, A. catechu, A. cochliacantha, A. cyclops, A. kamerunensis, A. mearnsii, A. mollissima A. nilotica, A. oxyphylla and A. pennata.*

Acacia albida: Reported triterpene saponins and other compounds from *Acacia albida* are Albidoside A (**1**), Albidoside B (**2**), Albidoside C (**3**), Albidoside D (**4**), Albidoside E (**5**), Albidoside F (**6**), Albidoside G (**7**) β-Amyrin (**8**), β-Sitosterol (**9**), β-Sitosterol-3-*O*-β-*D*-Glucopyranoside (**10**), Quercetin (**11**), Gallic acid (**12**), Rhamnocitrin (**13**), Afzelin (**14**), and (6S, 9S)-Roseoside (**15**), (Figure 1) (Tchoukoua *et al*., 2017; Mohammed *et al*., 2018).

Acacia catechu: Reported compounds from this plant are (3R, 4R)-3-(3,4-dihydroxyphenyl)-4-hydroxycy-clohexanone (**16**), (4R)-5-(1-(3,4-dihydrophenyl)-3-oxobutyl)-dihydrofuran-2(3H)-one (**17**), 4-Hyroxybenzoic acid (**18**), Kaempferol (**19**), 3,4′,7-trihydroxy-3′, 5-dimethoxyflavone (**20**),

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Catechin (**21**), Epicatechin (**22**), Afzelechin (**23**), Epiafzelechin (**24**), Mesquitol (**25**), Ophioglonin (**26**), Aromadendrin (**27**), and Phenol (**28**) (Figure 2) (Li *et al*., 2011).

Acacia cyclops: Isolated saponins and other compounds with chemical structure from this plant consisting alleopathic effect are Mollisside B (**35**), (*Z*)-3-hexen-1-ol acetate (**36**), 4-Oxoisophorone (**37**), (*Z*)-β-ocimene (**38**), Cyclopside 1 (**39**), Cyclopside 2 (**40**), Nonadecane (**41**), and Caryophyllene (**42**) (Figure 4) (Kotze *et al*., 2010; Jelassi *et al*., 2014, 2016).

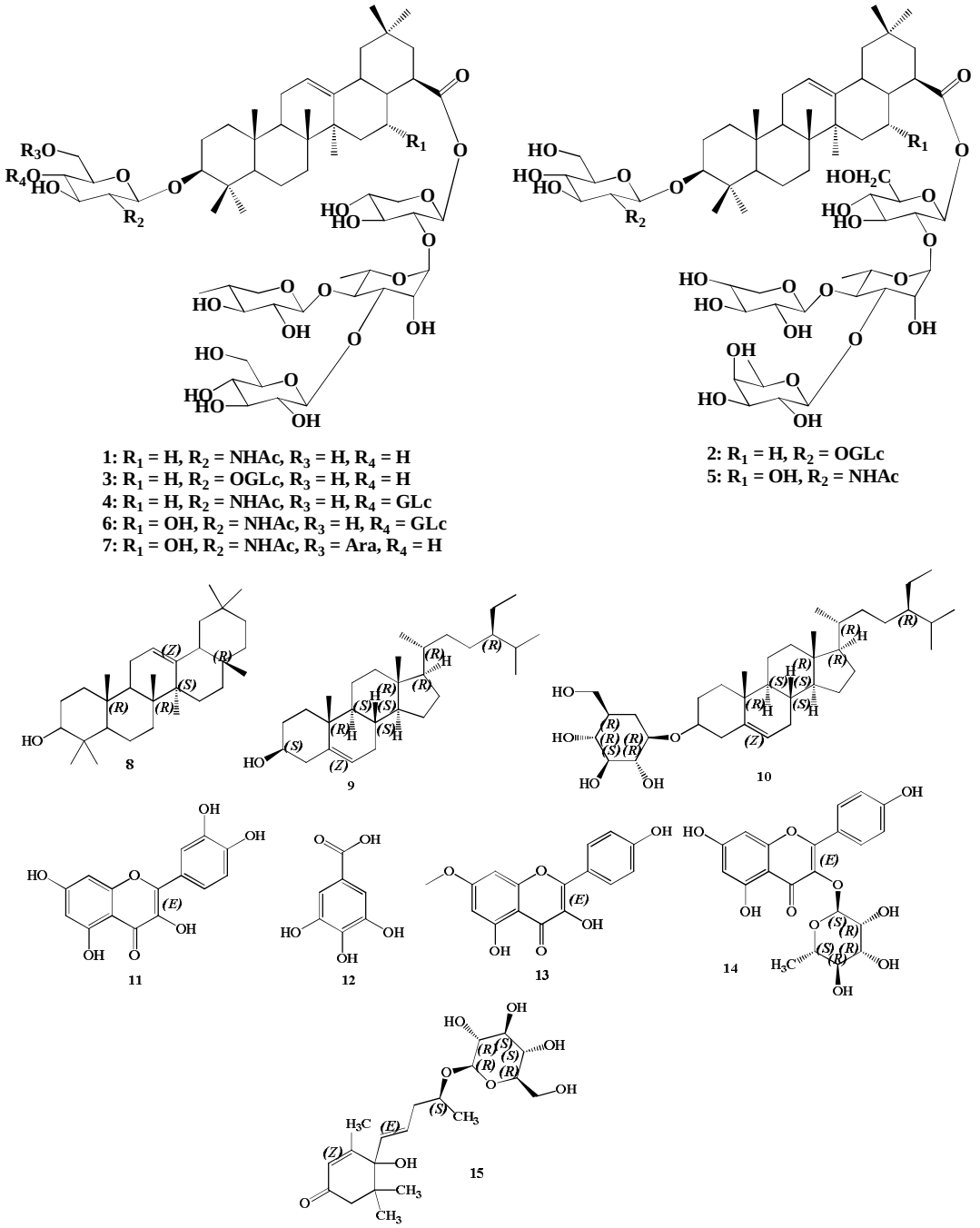


Figure 1. Triterpene saponin and other compounds from *Acacia albida.*

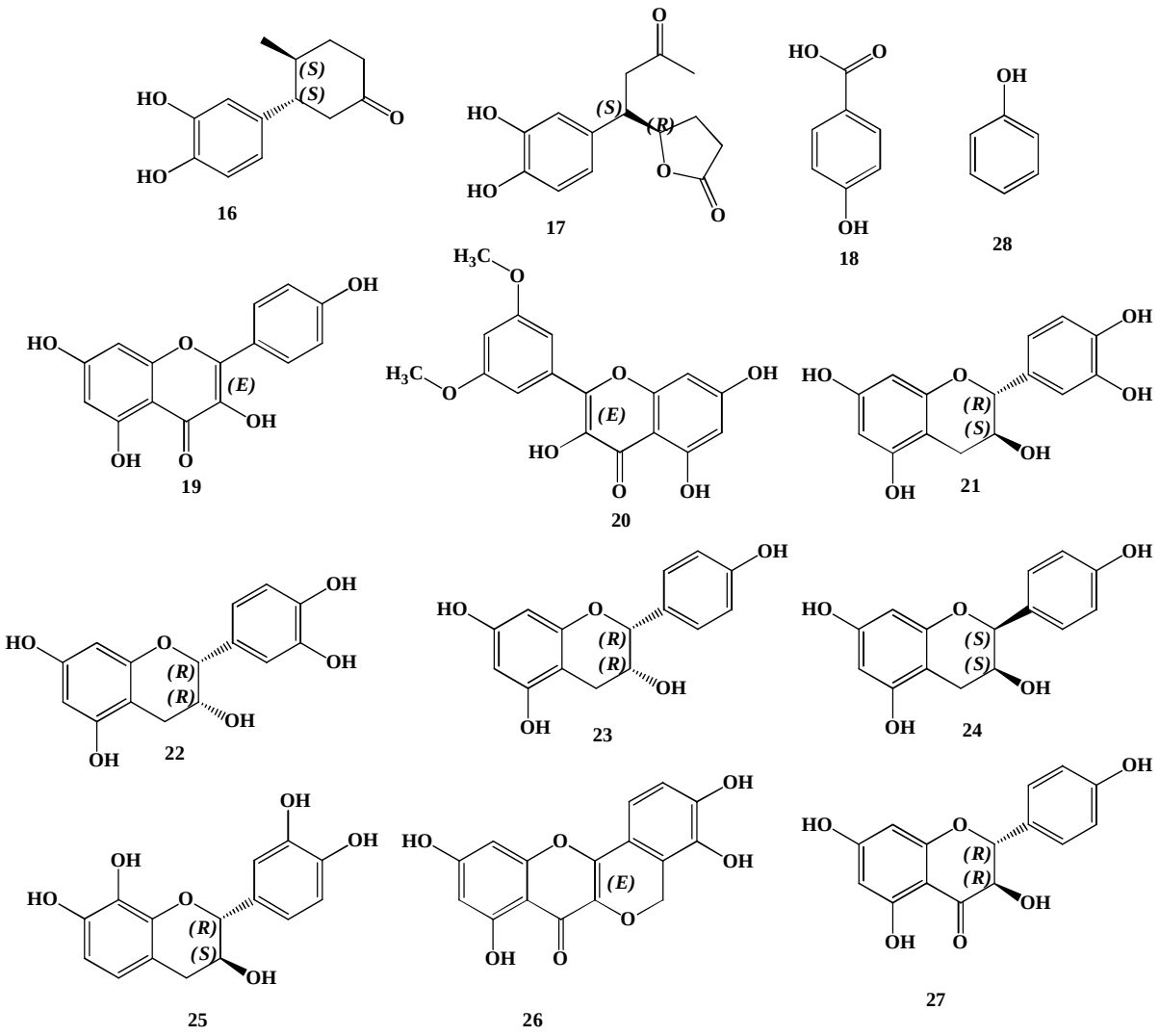


Figure 2. Compounds from *Acacia catechu.*

Acacia cochliacantha: Elucidated secondary metabolites having ovicidal activity from this species are Caffeic acid (**29**), *p*-Coumaric acid (**30**), Ferulic acid (**31**), Methyl caffeate (**32**), Methyl-p-coumarate (**33**), and Methylferulate (**34**) (Figure 3) (Castillo-Mitre *et al*., 2017).

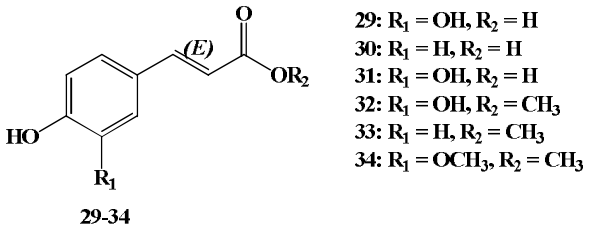


Figure 3. Reported molecules from *Acacia cochliacantha.*

Acacia kamerunensis: Separated phytochemicals having cytotoxic activity from this species are Kamerunoside A (**43**), Kamerunoside B (**44**), and Kamerunoside C (**45**) (Figure 5) (Tchoukoua *et al.*, 2018).

Acacia nilotica: The elucidated chemical compounds from this species with antioxidant characteristics are Quercetin (**11**), Gallic acid (**12**), Catechin (**21**), Methyl gallate (**51**), Catechin 5-O-gallate (**52**), Gallocatechin-5-O-gallate (**53**), 1-O-galloyl-β-*D*-glucose (**54**), 1,6-di-O-galloyl-β-D-glucose (**55**), Digallic acid (**56**), Acacetin (**57**), 1,2,3-Benzenetriol (**58**), α,β-glucooctanoic acid (**59**), Isoproposy-2-dimethyl-silyloxybenzene (**60**),

Proflavine (**61**), and Methyl 10-methyl-undecanoate (**62**) (Figure 7) (Salem *et al*., 2011; Rather *et al*., 2017; Revathi *et al*., 2017).

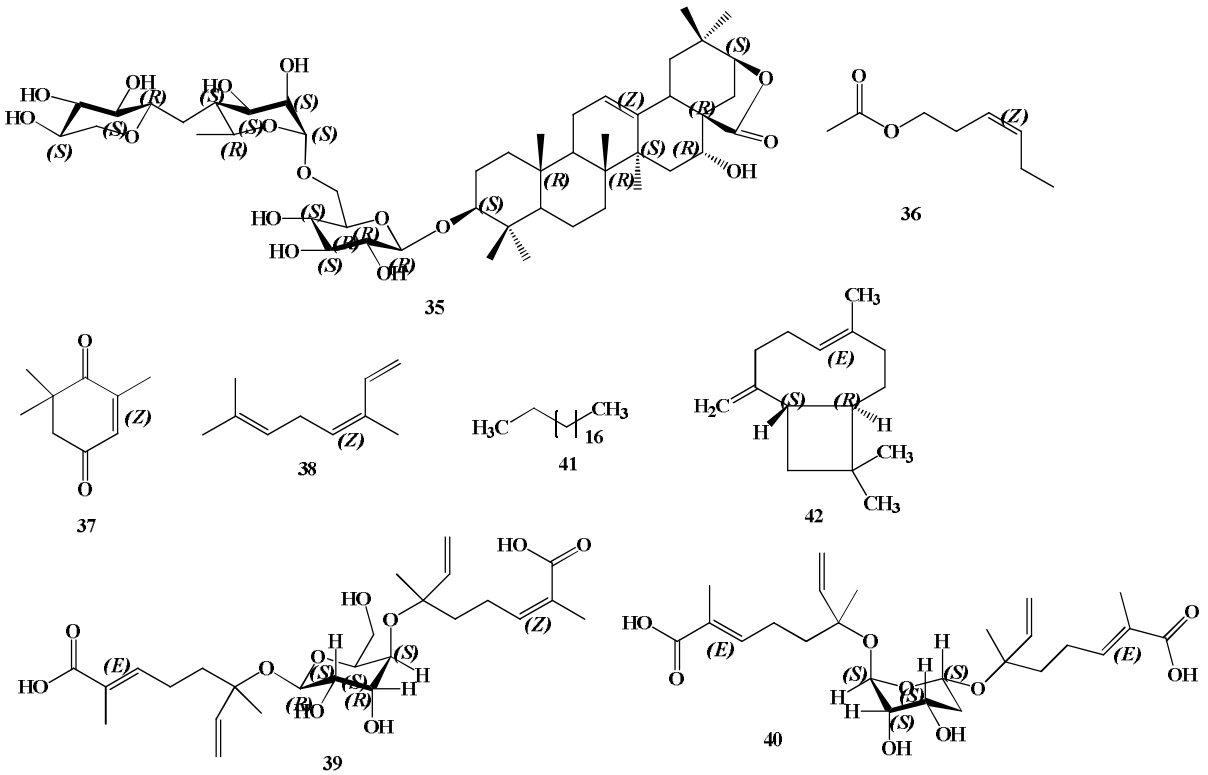


Figure 4. Molecules from *Acacia cyclops.*

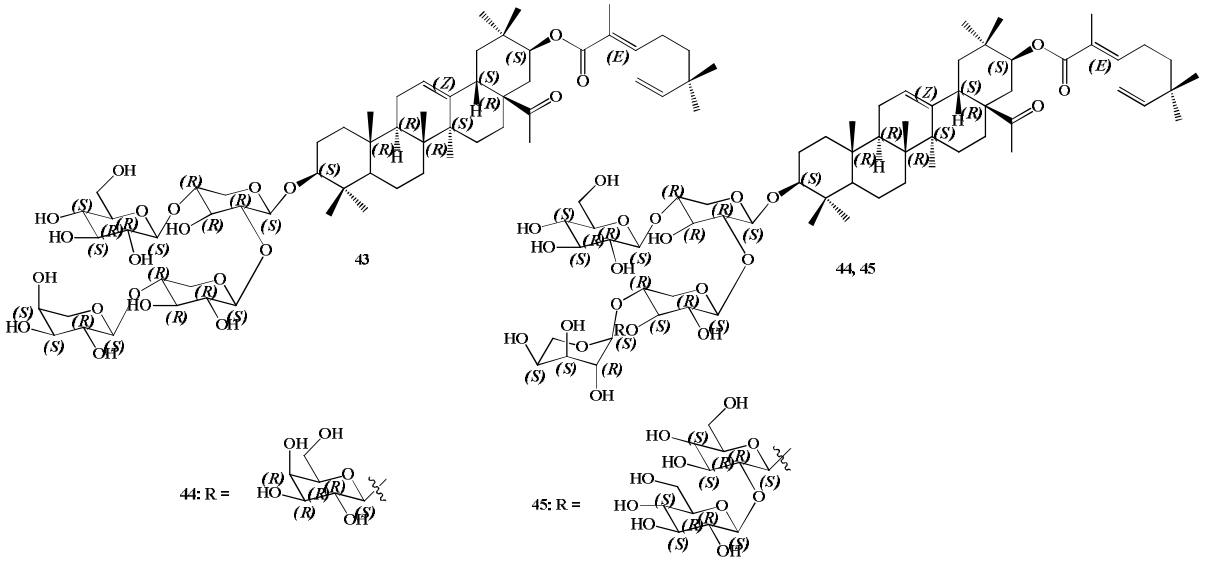


Figure 5. Triterpene saponins from *Acacia kamerunensis.*

Acacia mearnsii: Elucidated chemical moieties from this medicinal plant are Catechin (**21**), Gallocatechin (**46**), Fisetinidol (**47**), Fisetinidol-4-ol (**48**), Robinetinidol (**49**), and Robinetinidol-4-ol (**50**). The reported phytoconstituents showed anti-inflammatory and carbolytic activity (Figure 6) (Jia *et al.*, 2017).

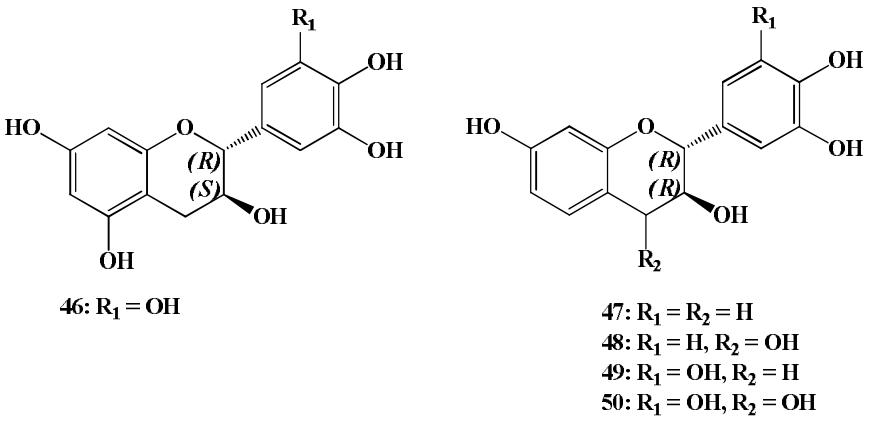


Figure 6. Phytoconstituents from *Acacia mearnsii.*

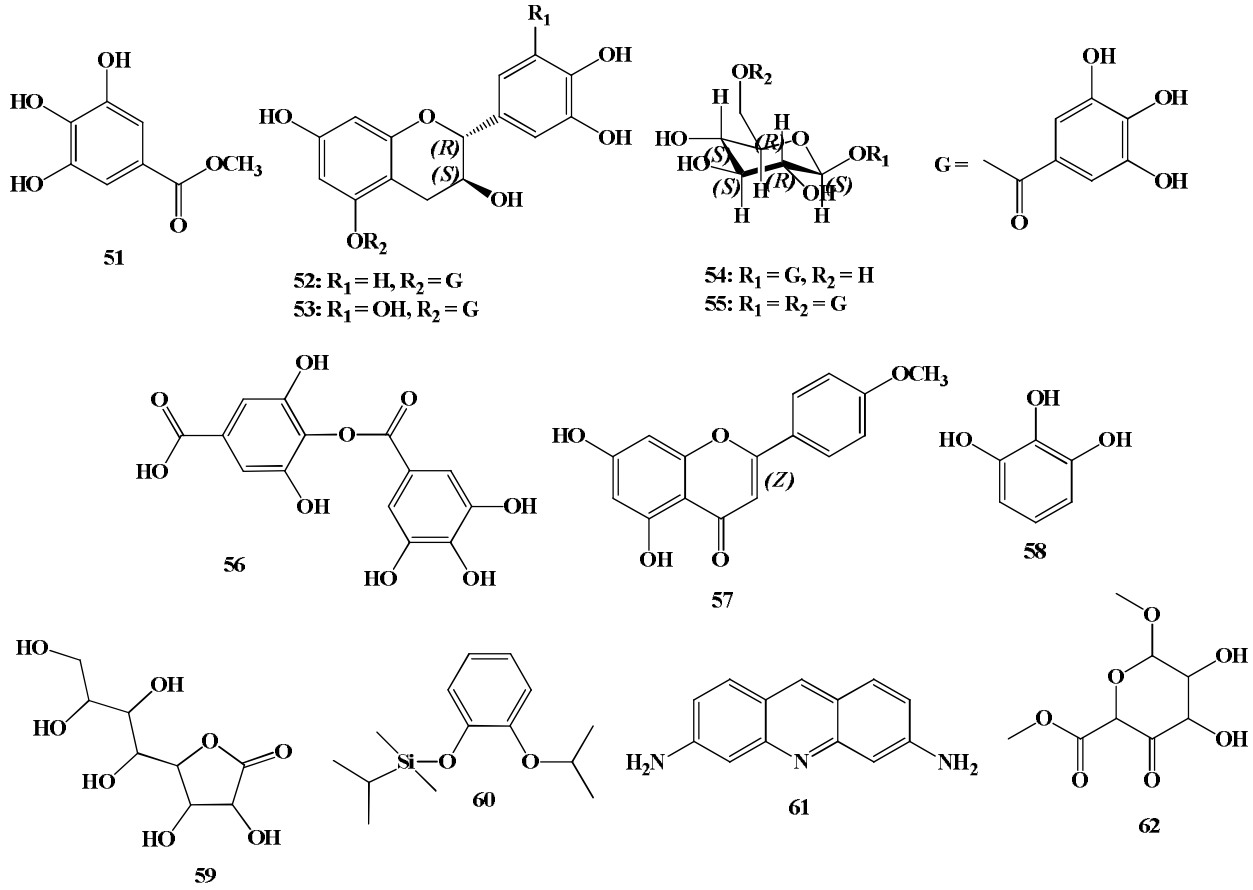
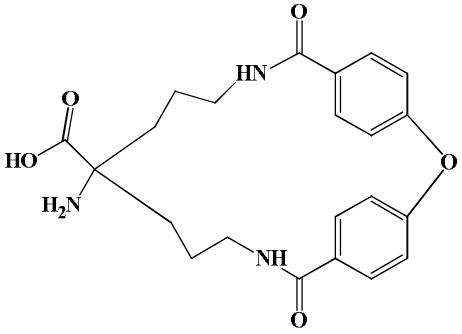


Figure 7. Compounds from *Acacia nilotica.*

Acacia oxyphylla: Isolated compound having anthelmintic property from this plant is 12-Amino-7,17-dioxo-2-oxa-8,16-diazatricylo [14.2.2.23, 6] tetraicosa-1 (20),3,5,18,21,23-hexaene-12-carboxylic acid (**63**) (Figure 8) (Roya *et al.*, 2012).



63

Figure 8. Molecule from *Acacia oxyphylla.*

Acacia pennata: Derived flavonoid glycosides from this plant are 2R, 3S)-3,5,7-trihdyroxyflavan-3-*O*-α-L-rhamnopyranoside (**64**), (2S)-5,7-dihydroxy-flavan-7-*O*-β-*D*-glucopyranoside-(4a→8)-epiafzele-chin-3-*O*-gallate (**65**), (2R)-4,7-dihydroxyflavan-(4α→8)-(2R, 3S)-3, 5,7-trihdyroxyflavan-3-*O*-α-L-rhamnopyranoside (**66**), 5,7-dihydroxyflavone-6-C-β-boivinopyranosyl-7-*O*-β-*D*-glucopyranoside (**67**), 5,7-dihydroxyflavone 7-*O*-β-*D*-glucopyranosyl-8-C-β-boivinopyranoside (**68**), Quercetin-3-*O*-β-*D*-gluco-pyranoside (**69**) Quercetin-3-*O*-α-L-rhamnopyra-noside (**70**), Chrysin-7-*O*-β-*D*-glucopyraniside (**71**), 3-*O*-α-L-Rhamnopyranoside (**72**), Koaburanin (**73**), and Pinocembrin-7-*O*-β-*D*-glucopyranoside (**74**) (Figure 9) (Kim *et al*., 2015).

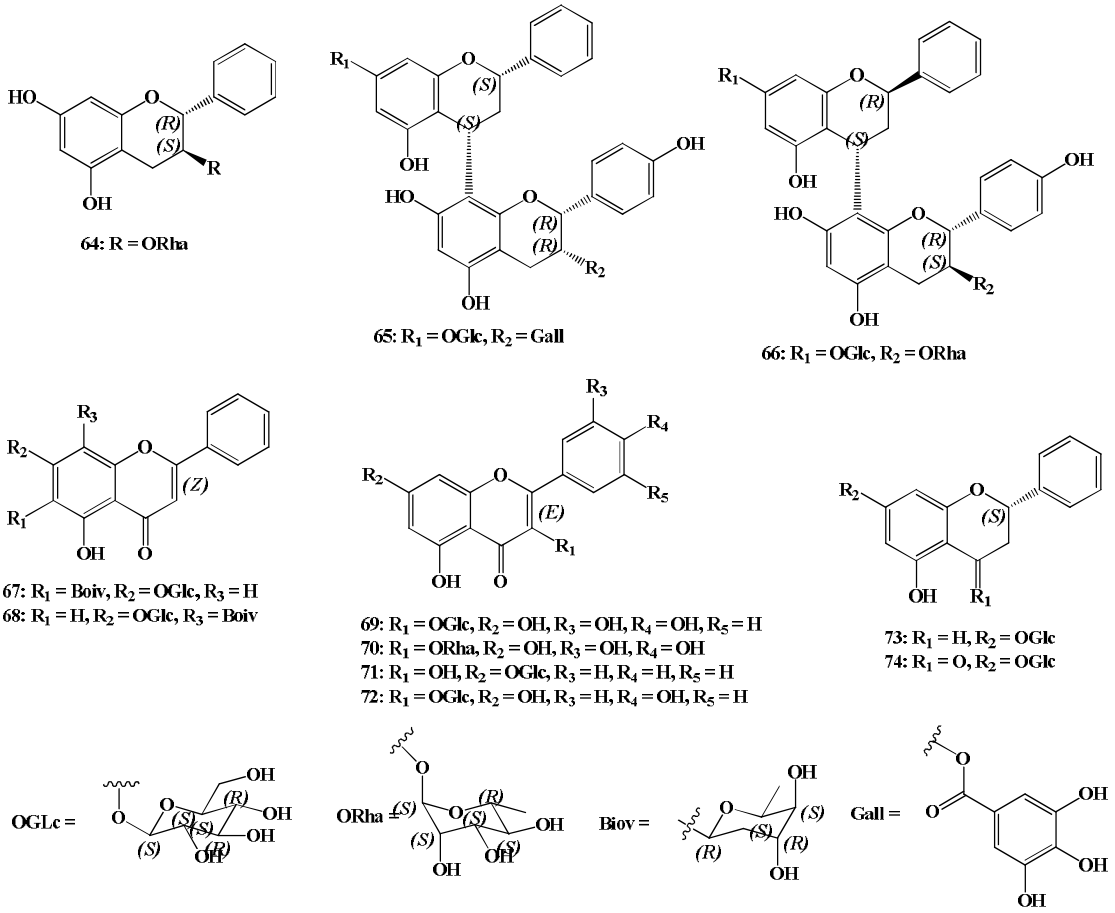


Figure 9. Glycosides from *Acacia pennata*.

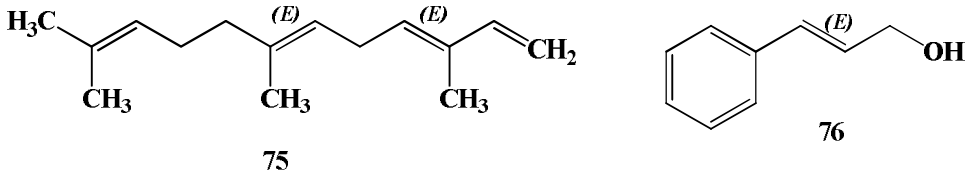


Figure 10. Constituents of essential oils from *Acacia mollissima*.

Acacia mollissima: Reported essential oil from *Acacia mollissima* are (*E*,*E*)-α-Farnesene (**75**) and (*E*)-Cinnamyl alcohol (**76**) (Figure 10) (Jelassi *et al*., 2017).

Conclusion

Chemical compounds from ten species of *Acacia* have been studied and structurally different molecules were achieved from these species. This review revealed that *Acacia* can be a great source of secondary metabolites as well as pharmaceutical moieties.

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