

FLAVONOIDS OF SOME DILLENIACEAE SPECIES*

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Key Word Index—*Wormia triquetra*; *W. burbidgei*; *Dillenia indica*; *D. retusa*; *Acrotrema uniflorum*; Dilleniaceae; flavonoids.

Kubitzki [1] investigated the flavonoids in herbarium samples of a large number of species of Dilleniaceae. In the present investigation the flavonoids in the bark and wood of *Wormia triquetra* Rottb, *W. burbidgei* Hook. f., *Dillenia indica* L. [2], *D. retusa* Thunb and *Acrotrema uniflorum* Hook have been isolated by silica gel chromatography and characterized. The amounts of flavonoids, gallic acid and sitosterol from dif-

ferent parts of each plant, are given in Table 1.

Flavonols and 3-hydroxyflavanones are common in these plants while flavones are totally absent. Only one flavanone-naringenin, was isolated from *Dillenia indica*. The unmethylated flavonoids are more common than the methylated ones. *Wormia triquetra* Rottb, *W. burbidgei* Hook. f. and *Dillenia retusa* Thunb possess only free flavonoids, while *D. indica* L. possesses both free and methylated flavonoids. In *D. indica* L. methylation takes place exclusively in ring-B

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Table 1. Amount of flavonoids (mg% on dry wt)

Compound	<i>Wormia triquetra</i> * Rottb.	<i>Wormia burbidgei</i> Hook. f.	<i>Dillenia indica</i> L.	<i>Dillenia retusa</i> * Thunb.	<i>Acrotrema uniflorum</i> * Hook.
Kaempferol	8 (b) 1.4 (t) 9 (f)	6 (b)	4 (b) 1.4 (t) 2 (p)	1 (t) 10 (f)	74
4'-OMe kaempferol (+)-Dihydrokaempferol	1 (b) 9 (t)		9 (t)	5 (b)	
Quercetin	20 (b)	3 (b)		0.5 (b) 0.6 (t) 7 (f)	98
Isorhamnetin			4 (b) 1.2 (t) 1.3 (f) 7 (p)		
3',4'-Di-O-methylquercetin (Dillenetin) (+)-Dihydroquercetin				0.3 (b) 0.4 (t)	
(+)-3'-OMe-Dihydroquercetin			3 (b)		
Naringenin			2 (b)		
Gallic acid	40 (b)	130 (b)	5 (t)	36 (t)	
Sitosterol	52 (b) 8 (t) 150 (fl. centre) 540 (f)	63 (b)	4 (b) 3 (t) 100 (p)	28 (b) 9.6 (t) 200 (f)	

* Endemic species.

b = bark; t = timber; f = fruits; p = pericarp.

as shown by the presence of kaempferide, isorhamnetin and dillenetin.

EXPERIMENTAL

The identity of all the above compounds was confirmed by comparing with authentic sample by mmp, Co-TLC, IR and UV. Mp's were determined on a Kofler hot stage.

Wormia triquetra bark and timber were collected from Kanneliya forest; fruits from Botanical Gardens, Peradeniya. Bark (5 kg) and timber (8.5 kg) were successively extracted with cold light petrol and hot MeOH. EtOAc extracts of the MeOH fraction of the bark when subjected to column chromatography over Si gel furnished: quercetin mp 310° (lit. [3] mp 313–316°); gallic acid mp 252° (lit. [4] mp 254°); kaempferol mp 268–270° (lit. [5] mp 279°); and (+)-dihydrokaempferol, mp 225–226° (lit. [5] mp 222–224), $[\alpha]_D^{27} + 13^\circ$ (EtOH) (lit. [7], $[\alpha]_D + 13^\circ$) acetate mp 83° (lit. [3] mp 82–84°). Similarly EtOAc extract of wood furnished kaempferol and its dihydro derivative Et₂O extract of the fruits afforded kaempferol.

Wormia hurbidgei. Bark (4.75 kg) was collected from Royal Botanical Gardens, Peradeniya and extracted as above. EtOAc extract of the MeOH extract furnished kaempferol, quercetin and gallic acid.

Dillenia indica. Bark (5.5 kg) and wood (8.8 kg) and pericarp (7.6 kg) were extracted as usual. EtOAc extract of the MeOH fraction of the bark yielded: isorhamnetin mp 295° (lit. [8] mp 305–307°); naringenin mp 247° (lit. [6] mp 248°); (c) 3-OMe dihydroquercetin mp 230° (lit. [2b] mp 230°) and kaempferol. Similarly, from the wood the following were isolated: isorhamnetin, kaempferol, dihydrokaempferol and gallic acid. Hot EtOAc extract of the MeOH fraction of the pericarp yielded: 4'-O-Me kaempferol mp 228–229° (lit. [9] mp 227–229°); isorhamnetin and dillenetin mp 290–292° (lit. [10] mp 291–292°).

Dillenia retusa. Bark and wood were collected from Kanneliya forest. The powdered bark (18 kg) and wood (12.5 kg) were extracted as usual. EtOAc extract of the MeOH fraction of bark furnished: dihydroquercetin mp 235° (lit. [11] mp 230–232°), $[\alpha]_D^{27} + 11^\circ$ (lit. [7] $[\alpha]_D^{27} + 13^\circ$); dihydrokaempferol and quercetin.

Similarly from the wood the following compounds were isolated: gallic acid, kaempferol, quercetin and its dihydro-derivative. The fruits furnished kaempferol and quercetin.

Acrotrema uniflorum. The plants were collected from Ratnapura. Whole plants (205 g) were extracted with hot light petrol and hot MeOH. EtOAc extract of the latter extract yielded kaempferol and quercetin.

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