Pinoresinol and syringaresinol: two lignans from *Avicennia germinans* (Avicenniaceae)

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1. Subject and source

*Avicennia germinans* (L.) L. (Family: Avicenniaceae alt. Verbenaceae), commonly known as “black mangrove” is widely distributed in West Africa, and North and South America (USDA-ARS GRIN database, 1999). Plant material was collected from Costa Rica and supplied by Biotics Limited, University of Sussex, Brighton, UK. A voucher specimen (MNL10040) has been retained at the herbarium of the Institute of Grassland and Environmental Research, Aberystwyth, UK.

2. Previous work

Iridoid glucosides have previously been reported from *A. geminans* (Fauvel et al., 1999, 1997, 1995; Bousquet-Melou and Fauvel, 1998), and from other species of the genus *Avicennia* (Nass and Rimpler, 1996; Pandey and Garg, 1996; König et al., 1987; König and Rimpler, 1985; Majumdar et al., 1981). Betaines (AdrianRomero
et al., 1998), phenylpropanoid glycosides (Fauvel et al., 1993) and megastigmane (Fauvel et al., 1999) have also been isolated from this genus.

3. Present study

Biotage™ 75 flash chromatography (silica gel, eluting with a step gradient of increasing polarity: \( n \)-hexane – EtOAc – MeOH) of the \( CH_2Cl_2 \) extract of branches of \( A. \) germinans (0.84 kg) has yielded nine fractions (1000 mL each). Reversed-phase preparative HPLC (C\(_{18}\) preparative column, eluted with a gradient water: acetonitrile: 0.1% TFA in acetonitrile = 80:10:10 to 50:40:10 in 25 min, 55 ml/min, detection at 205 nm) of the flash fraction 7 (75% EtOAc in \( n \)-hexane) has afforded pinoresinol (1, 11.1 mg) (Vermes et al., 1991). Syringaresinol (2, 5.6 mg) (Vermes et al., 1991) has been isolated from flash fraction 8 (100% EtOAc) using the same purification method. Structures of these compounds have been determined by UV, LC-MS and extensive NMR (1D and 2D) analyses, and also by direct comparison with the respective literature data.

Chemotaxonomic significance

To our knowledge, this is the first report on the occurrence of lignans in the Avicenniaceae. The Avicenniaceae comprises only the genus \( Avicennia \) which was previously described under the family Verbenaceae. Lignans have previously been reported from the Verbenaceae (Kawazoe et al., 1999; Habtemariam et al., 1995; Chawla et al., 1992). The systematic position of \( Avicennia \) has not been established yet (Fauvel et al., 1995). Lignans, are widely distributed in the plant kingdom (Castro et al., 1996), and apparently have very limited importance in plant systematics. However, the occurrence of lignans (1,2) in \( A. \) germinans, a
taxonomically very complicated species in which considerable variations do exist between populations growing in the Old, and New World (Dodd et al., 2000), might have some chemotaxonomic implications.

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References