

# Phytochemical examination of the leaves of *Psydrax ficiformis* Hook. f. Bridson. - an endangered tree

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## Abstract

Nineteen compounds were identified through GC-MS in the ethanol extract of the leaves of *Psydrax ficiformis* with five of them viz., oleic acid (49.18), n-hexadecanoic acid (27.98), 1-monolinoleoylglycerol trimethylsilyl ether (7.53), 11, 14-eicosadienoic acid methyl ester (3.81) and benzofuran, 2, 3-dihydro-coumaran compound (2.38) showing high peaks in the chromatogram.

**Keywords:** endangered tree, GC-MS, phytochemistry, *Psydrax ficiformis*, Rubiaceae

## INTRODUCTION

*Psydrax ficiformis* Hook.f.Bridson. is an endangered tree belonging to the family Rubiaceae (Fig. 1). It is an evergreen tree found at higher elevations which is until recently thought to be extinct (Matthew, 1996).



**Figure 1.** *Psydrax ficiformis* - courtesy: I. Selvaraj.

Approximately 119 pure chemical substances extracted from higher plants are used in medicine throughout the world and about 10% of our leading drugs now contain phytochemicals are still extracted directly from higher Plants (James and Mandavill, 1968). Hence an attempt has been made to study the phytochemicals present in this endangered plant and this is the first report about its chemical constituents.

## MATERIALS AND METHODS

Fresh, healthy leaves of *Psydrax ficiformis* were collected from Kodaikanal, South India, shade dried and made into powder. Twenty grams of the powder was submitted to alcoholic extraction (Abdulmoniem and Saadabi, 2006; Anbazhakan *et al.* 2007; Retnam and Britto, 2007).

### Alcoholic extraction

Twenty grams of the powdered plant material obtained from the leaf extract of *Psydrax ficiformis* was soaked in 50 ml of absolute alcohol overnight. It was filtered through whatmann filter paper No.41 along with 2 g sodium sulphate which has been wetted with absolute alcohol to remove the sediments and traces of water in the filtrate. The filtrates were then concentrated by bubbling nitrogen gas into the solution and reducing the volume to 1 ml. The alcoholic extraction was employed to recover both polar and non-polar compounds (Vanitha, 2007).

### Analysis of the sample extract

#### GC-MS Analysis

**Column:** Elite-1 (100% Dimethyl poly siloxane), 30m x 0.25mm ID x um df

**Equipment:** GC Clarus 500 Perkin Elmer

**Carrier gas:** Helium 1 ml/min

**Detector:** Mass detector- Turbo mass gold-Perkin Elmer

**Software:** Turbo mass 5.1.

**Sample injected:** 2 ul split: 10.1

### Details of Oven Temperature

110 deg – 2min hold

Upto 280 deg C at the rate of 5 deg/min – 9 min hold

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**Table 1.** Phytochemicals observed in the leaves of *Psydrax ficiformis* and their presumed biological activity

No	RT <sup>a</sup> (sec)	Name of the compound	Molecular Formula	MW <sup>b</sup>	Peak Area %	Compound Nature	Activity**
1	9.17	Benzofuran, 2,3-dihydro-coumaran compound	C8H8O	120	2.38	Coumaran compound	Antimicrobial
2	10.97	Hydroquinone	C6H6O2	110	0.68	Poly phenol	Anti-inflammatory Analgesic, Anesthetic, Antioxidant, Antiseptic, Antibacterial, Antiviral
3	11.31	2-Methoxy-4-vinylphenol	C9H10O2	150	1.27	Phenolic compound	Cancer preventive, Fungicide, Rodenticide
4	14.38	Propiophenone, 2'-methyl-	C10H12O	148	0.45	Ketone compound	Emetic, Vasodilator.
5	15.09	n-Decanoic acid	C10H20O2	172	0.68	Fatty acid	No activity reported
6	17.73	Amyl Nitrite	C5H11NO2	117	0.05	Nitrite compound	Insecticide
7	20.36	Heptane, 1-nitro-	C7H15NO2	145	0.07	Nitrogen compound	Vasodilator
8	21.50	2,3-Epoxyhexanol	C6H12O2	116	0.26	Alcoholic compound	Antimicrobial
9	22.82	4H-1-Benzopyran-4-one, 5-hydroxy-7-methoxy-2-methyl-	C11H10O4	206	0.94	Aromatic compound	Antimicrobial No activity reported
10	23.18	1,14-Tetradecanediol	C14H30O2	230	0.71	Aliphatic alcohol	Antimicrobial
11	23.65	2-Decen-1-ol	C10H20O	156	0.12	Alkene compound	No activity reported
12	24.03	1-Undecyne	C11H20	152	0.21	Alkene compound	No activity reported
13	24.68	Tridecanoic acid, methyl ester	C14H28O2	228	1.22	Fatty acid ester	No activity reported
14	25.52	n-Hexadecanoic acid	C16H32O2	256	27.98	Palmitic acid	Antioxidant, Hypocholesterolemic Nematocide, Pesticide, Lubricant, Antiandrogenic, Flavor, Hemolytic
15	27.95	11,14-Eicosadienoic acid, methyl ester	C21H38O2	322	3.81	Fatty acid ester	5-Alpha reductase inhibitor Hypocholesterolemic
16	28.33	Phytol	C20H40O	296	1.29	Diterpene	Antimicrobial Anti-inflammatory Diuretic
17	28.80	Oleic Acid	C18H34O2	282	49.18	Unsaturated fatty acid	Anticancer Anti-inflammatory, Antiandrogenic Cancer preventive, Dermatitigenic Hypocholesterolemic, 5-Alpha reductase inhibitor, Anemiagenic
18	31.25	Undecanoic acid, hydroxy-, lactone	C11H20O2	184	1.18	Lactone compound	Insectifuge, Flavor
19	40.24	1-Monolinoleoylglycerol trimethylsilyl ether	C27H54O4Si2	498	7.53	Ether compound	No activity reported

\*\*Dr. Duke's Phytochemical and Ethnobotanical Databases

<sup>a</sup> - RT = Retention Time <sup>b</sup> = MW = Molecular Weight

Injector temp: 250 deg C

Total GC time: 45 min

### Details of MS

Library used: NIST Ver.2.0 – Year 2005

Inlet line temperature: 200 deg C

Source temperature: 200 deg C

Electron energy: 70 eV

Mass scan: (m/z) 45 – 450

MS Time:45 min

### Identification of compounds

The chemical constituents were identified by Gas Chromatography (GC) by comparing their Kovats indices with those of authentic standards available in the laboratory. Further identification was done by GC - MS. The fragmentation patterns of mass spectra were compared with those stored in the spectrometer database using NIST libraries and with those published in the literature (Admas, 1989). The percentage of each component is calculated from the relative peak area of each component in the chromatogram. The phytochemical activity of the phytochemicals were tabulated in Table 1. with reference to Dr. Duke's Phytochemical and Ethnobotanical Databases (Duke, 1998).

### RESULTS AND DISCUSSION

The leaf extract of *Psydrax ficiformis* contained 19 compounds belonging to different categories. The chemical components identified, the percentage of each constituent and their retention times, nature of the components and their activities are summarized in Table 1.

Recent knowledge tells us that almost every plant has got one or the other valuable component of medicinal importance. Oleic acid which is reported to be present in the leaves of this plant possesses many medicinal properties such as anti-inflammatory, anti androgenic, cancer preventive, dermatitogenic, hypocholesterolemic, 5-alpha reductase inhibitory, anemiagenic and insectifuge. Oleic acid is the major component of olive oil (Tous and Ferguson, 1996) and dieticians advice their cardiac patients to use olive oil in food due to its hypocholesterolemic activity (Ruth *et al.*, 2003). It also possesses antioxidant property and this property is used in cosmetics for the preparation of anti-aging cream. n-Hexadecanoic acid also possesses biological activity similar to that of oleic acid. So far no activity of 1-Monolinoleoyl glycerol trimethyl silylether is reported and could be considered for further research. Bensofuran has antimicrobial and anti-inflammatory activity and is used as medicine mostly in ointments.

Since *P. ficiformis* contains important chemical compounds such as oleic acid, hydroquinones, n-hexadecanoic acid etc., which are reported to have various therapeutic uses, further isolation and detailed study of them may reveal their utility fully.

### ACKNOWLEDGEMENT

I thank Mr. Bob Stewart and Mrs. Tanya Balcar, Vattakanal Conservation Trust, Kodaikanal for providing the specimens, other suggestions, accomodation facilities. Thanks are also due to Staff members, Botany Department, Bishop Heber College, Trichy for their valuable suggestions.

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