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Note

Essential oil composition of *Gliricidia sepium* (Leguminosae) leaves and flowers

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Forty two known compounds have been found in the leaves and flowers of *Gliricidia sepium.* Of these, sixteen have been identified and quantified from the leaf essential oil by GC and twenty six have been identified and quantified from the flower essential oil by GC-MS analysis. The major compounds of the leaf oil are found to be propyleneglycol (25.1%), coumarin (18.2%), (*Z*)-3-hexenol] (17.7%), β-farnesene (14.2%) and (*E*)-2-hexenol (6.5%); and coumarin (43.1%), hydroquinone (21.6%) and myrtenol (12.7%) in the flower oil. In the light of the toxicity of coumarin and hydroquinone, this finding is a warning signal against the use of the leaves as fumigant against mosquitoes and the flower as a food material.

Keywords: *Gliricidia sepium,* coumarin, hydroquinone, propyleneglycol, toxicity

Gliricidia sepium (Leguminosae) is a medium sized tree introduced into India from the American continent. Its flowers are used as vegetable in Philippines and Central America[1]. Various phytochemicals like flavones, chalcones, coumarin, *o*-coumaric acid, melitolic acid, ceryl alcohol, kaempherol glycosides, hydrocarbons, quercetin glycosides, canavanin, triterpenoid saponins and rotenoids from various parts of this plant have been isolated and characterised[2-13]. This work was initiated on our first hand information that the leaves of *G. sepium* are being used as a fumigant to repel mosquitoes in some parts of Kerala, India. The same has also been presented as exhibits in school science fares leading to its popularisation. The use of the flowers as food[1] was also of interest.

Experimental Section

The leaves and flowers of *G. sepium* were collected from the area around Calicut University, Kerala, India, and identified by Dr A K Pradeep, Department of Botany, Calicut University.

The fresh leaves (2 kg) and fresh flowers (1.5 kg) of *G. sepium* were both ground separately using an electric mixer grinder and subjected to steam distillation for three hr. The distillates were extracted with diethyl ether (3 × 100 mL) and dried using anhydrous sodium sulphate. The dry ether extract on evaporation yielded 0.52 g (leaf oil) and 0.41 g (flower oil), respectively.

The GC-MS analysis were carried out by using a Shimadzu GC-17A with QP5050 and the data system HP-Compaq (class 5K-software), Hewlett-Packard GC-HP 5890 with HP-5970 MSD and PC-Pentium (Böhm Co; Chemstation-Software) and Finnigan MAT GCQ mass spectrometer with data system Gateway-200-PS75 (Siemens Co; GCQ-software). An apolar 30 m OV-1-type column (0.32 mm i.d. and 0.25 μm film thickness) and helium as carrier-gas were used. Injector temperature: 250°C; interface heating: 300 °C; ion source heating: 200°C, EI-mode; scan range: 41-450 amu. For compound identifications Wiley-, NBS-, and NIST-library spectra (on line) as well as reference MS-spectral data were used[14,15].

GC-FID analyses were carried out using a Shimadzu GC-14A with FID and the integrator C-R6A-Chromatopac] and a Varian GC-3700 with FID and the integrator C-RIB-Chromatopac (Shimadzu Co.). The same column used for GC-MS was used for GC-FID. Carrier gas: hydrogen; injector-temperature was at 250°C and detector temperature at 320°C; temperature-program: 40°C/5 min to 280°C/5 min with a heating rate of 6°C/min. Quantifications were made by relative % peak-area calculations.

Results and Discussion

Forty two known compounds have been found in the leaves and flowers of *Gliricidia sepium.* Of these, sixteen have been identified and quantified from the leaf essential oil by GC and twenty six have been identified and quantified from the flower essential oil by GC-MS analysis. **(Tables I** and **II)**. The major compounds present in the leaf oil were

Table I—Chemical composition of the leaf essential oil of *Gliricidia sepium*

Identified components	Percentage
Propyleneglycol	25.1
Coumarin	18.2
(*Z*)-3-Hexenol	17.7
β-Farnesene	14.2
(*E*)-2-Hexenol	6.5
Thymol	3.6
Benzyl alcohol	3.5
Caryophyllene	2.3
α-Farnesene	2.0
2-Pentene-1-ol	<1
Isovanillin	<1
Isobutyl alcohol	<1
Phenylethyl alcohol	<1
Phenol	<1
Crotonic aldehyde	<1
5,6-Dihydro-*4H*-cyclopenta-(6)-furan	<1

Table II—Chemical composition of the flower essential oil of *Gliricidia sepium*

Identified components	Percentage
Benzyl alcohol	0.35
Nonanol	0.62
Maltol	4.42
3-Nonanol*	1.50
2-Octanoic acid*	1.26
2-Butyl-2-hexanol	1.46
Octanoic acid	1.53
2-Butyl-3-hexanol	1.03
Myrtenol	12.73
Dihydrocarveol acetate*	0.30
Eucarvone	0.88
Geraniol	0.72
Nonanoic acid	0.55
Myrtenal	0.78
Hydroquinone	21.64
p-Mentha-1,8-dien-9-ol	1.83
4-Hydroxy-3-methylacetophenone*	0.37
p-Mentha-1,4-dien-2-ol	0.73
p-Mentha-1,4-dien-7-ol	0.71
Decanoic acid	0.31
γ-Nonalactone	1.31
Coumarin	43.07
Allyl tiglate*	0.44
Dodecanoic acid	0.64
Tetradecanoic acid	0.46
3Tetradecanoic acid*	0.36

*Tentative identification

propyleneglycol (25.1%), coumarin (18.2%), (*Z*)-3-hexenol (17.7%), β-farnesene (14.2%) and (*E*)-2-hexenol (6.5%). The components of the flower oil were : coumarin (43.1%), hydroquinone (21.6%) and myrtenol (12.7%).

As coumarin is a known toxic chemical[16] the fumigation of *G. sepium* leaves as a mosquito repellent pauses serious health risk. The high percentage of hydroquinone, a topoisomerase II poison[17], in the flowers makes it an unhealthy food material. Also, to our knowledge, this is the first report on the isolation of propyleneglycol from a natural source.

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