

RARE**GAS CHROMATOGRAPHICAL AND ANTIMICROBIAL STUDIES****ON *Alpinia calcarata* AND *Piper betle*****FROM SRI LANKA**

by

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ABSTRACT

Gas chromatographical and antimicrobial studies on the essential oil and solvent extracts of two medicinal plants namely *Alpinia calcarata* Roscoe (*Sinh.* Heenaratha) and *Piper betle* Linn. (*Sinh.* Bulath) are reported in the present study. This is the first report of the gas chromatographical and antimicrobial study of these two plants from Sri Lanka.

Gas liquid chromatography / mass spectroscopic studies on the essential oil from the rhizome, root and leaves of *A. calcarata* Roscoe indicated that at least twenty two major compounds. Of these nineteen were identified as α -pinene (4), camphene (5), β -pinene (6), *p*-cymene (67), limonene (66), 1,8-cineole (9), fenchone (13), linalool (14), fenchol (15), camphor (17), isoborneol (79), 4-terpineol (20), α -terpineol (21), fenchyl acetate (24), β -caryophyllene (28), α -cadinene (80), γ -muurolene (81), carotol (82) and α -eudesmol (83). The relative abundance of the compounds identified varied with the part of the plant from which the oil was extracted. 1,8-cineole (9) was the major compound in the rhizome (33.32 %) and leaf oil (24.71 %) but fenchyl acetate (24) (39.78 %) was the major compound in the root oil of *A. calcarata* Roscoe from Sri Lanka. In the present study it was found that the rhizome, root and leaf oil of *A. calcarata* Roscoe contains limonene(66), *p*-cymene (67), isoborneol (79), α -cadinene, (80), γ -muurolene (81), carotol (82) and α -eudesmol (83). These compounds have not been preveously reported from the genus *Alpinia*.

Antibacterial studies indicated that the essential oil and the petroleum ether extracts of the rhizome from *A. calcarata* Roscoe were active against *Escherichia coli* (NCTC 10148), *Pseudomonas aeruginosa* (NCTC 10662), *Staphylococcus epidermidis* (NCTC 4276), *Staphylococcus aureus* (NCTC 8532), *Streptococcus pyogenes* and *Streptococcus sanguis*. This is the first report of the antimicrobial activity of the essential oil of rhizome from *A. calcarata* Roscoe. At least two compounds of the essential oil and at least six compounds of the petroleum ether extract were found to be active against *Cladosporium sp.*

In Sri Lanka there are more than twelve cultivars of *P. betle* Linn., but no chemical studies have been carried out on these cultivars. The present study describes the anatomy, stomatal index, physical characters of the essential oil obtained from the leaves, the yield of the ethanol extracts of the leaves of six cultivars of *P. betle* Linn namely Galdalu, Mahamaneru, Kudamaneru, Ratadalu, Nagawalli and Malabulath. The stomatal index, length to width ratio of the leaves, physicochemical properties (specific gravity and the refractive index) and the constituents identified from the essential oil by GC/MS of Malabulath was different to that from the other cultivars. The major compound in Malabulath was allylpyrocatechol diacetate (126) while that in the common betel was safrole (99).

Chemical composition of the essential oil of the leaf, stalk, stem, fruit and root was different. The major compounds in the leaf, stem, stalk and root oil was safrole(99) but in the fruit it was β -phellandrene(109). 1,8- cineole(9) was detected only in the root oil.

Only leaf oil and fruit oil contained *p*-cymene(67) while β -phellandrene(109) was found in the oil from the leaf, the fruit and the root. Except leaf oil the other samples of oil contain γ -selinene(169) where α -terpineol(21) was present only in the oil from root. Further the composition of the oil varied with the stage of maturity of the leaf.

The essential oil from common betel was active against *Escherichia coli* (NCTC 10148), *Pseudomonas aeruginosa* (NCTC 10662), *Staphylococcus epidermidis* (NCTC 4276), *Staphylococcus aureus* (NCTC 8532), and *Streptococcus pyogens*. This is the first report of the antifungal activity from betel and it was found that there are at least three compounds present in the essential oil and one in the ethanol extract were active against *Cladosporium sp.*