COMPARATIVE PHYTOCHEMICAL PROFILES OF TWO ACCESSIONS OF MEMECYLON EDULE ROXB. (MELASTOMATACEAE) BY GC-MS ANALYSIS

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ABSTRACT
Memecylon edule Roxb. a member of Melastomataceae and a valuable Indian ethnomedicinal plant and there are two accessions of this species was investigated to determine the phytochemical constituents present in various extracts of the leaves through GC-MS analysis. Powdered leaf plant materials were subjected to successive extraction with organic solvents such as methanol by Soxhlet extraction method. In the present study, a total of phytocompounds, twenty eight from Acc.1 and twenty five from Acc.2 were identified by GC-MS analysis using methanolic leaf extract, all the identified compounds were medicinally valuable for the treatment of various human ailments. In addition, all the phytochemical compounds were needed for further investigations on toxicological aspects for the development of new lead of therapeutic interest.

Keywords: Phytochemical profile, Memecylon edule, GC-MS analysis.

1. INTRODUCTION
The genus Memecylon L., belonging to the family Melastomataceae, is represented world over by around 250 species of shrubs and trees in the paleotropical region. Of which 30 species has been reported from India (Henry et al., 1989; Santapau and Henry, 1973) and 16 species from Tamil Nadu state (Nair and Henry, 1983). Also the genus Memecylon is represented by 39 species of which 21 are endemic to the country and the Western Ghats is reported to host 29 species (Viswanathan and Manikandan, 2001; Santhosh Kumar et al., 2003; Rajendraprasad et al., 2006; Murugan and Gopalan, 2006; Manickam et al., 2007). They are distributed in all types of habitats (Sivu et al., 2013). Memecylon species are utilized worldwide as timbers, ornamentals, source of edible fruits and yellow dye in addition to their medicinal properties (Mabberley, 2005).

The leaves of M. edule is used to heal the burning wounds without scar. The anti-inflammatory, analgesic and antioxidant activities of the leaves used in traditional medicine in relieving inflammation and pain (Nualkew et al., 2009). Decoction of stem has also been relief fever symptoms of common diseases such as common cold, measles and chicken box (Karuppawamy, 2007). The antibacterial activity of seeds were evaluated (Elavazhagan and Arunachalam, 2010). After pursuit of published literature, so far meager work has been done regarding the phyto-chemical evaluation on this selected plant. Hence, in the present study GC-MS analysis was carried out with methanol extracts of the leaves of two accessions of Memecylon edule Roxb. to examine the chemical constituents present in it.

2. MATERIALS AND METHODS
2.1. Collection of plant materials and preparation of the extract
The fresh leaves of Memecylon edule were collected from Acc.1.Authukurichi (Lat, 11.35°N; Long, 79.31°E), Ariyalur District and Acc.2. Puthupattu, (12°05'74"N, 79°86'93"E) Villupuram District, Tamil Nadu, India. The specimen was botanically identified and confirmed by Rapinat Herbarium, St. Joseph’s College, Tiruchirappalli. The preserved plant specimens were submitted to the Department of Botany, Annamalai University, Annamalainagar, Tamil Nadu for further reference. The leaves were chopped into small pieces, shade-dried and coarsely powdered by using a pulverizor. The powdered leaf were subjected to successive extraction with organic solvents such as hexane, chloroform and ethanol by Soxhlet method (Catherine et al., 1997). The extracts were then collected and distilled off on a water bath at atmospheric pressure and the last trace of the solvents was removed in vacuo and stored at 4°C. They were used for GC-MS analysis.

2.2. Gas chromatography- mass spectrometry (GC-MS) analysis
GC-MS analysis was performed with GC-MS Clarus 500 Perkin Elmer Equipment. Compounds were separated on Elite-5 capillary column (Crossbond 5% Phenyl 95% dimethylpolysiloxane) Oven temperature was programmed as follows:
isothermal temperature at 60°C then increased to 200°C at the rate of 10°C/min., then increased up to 280°C at the rate of 5°C/min. held for 9 min. Ionization of the sample components was performed in the Electron energy (70 eV). The helium was used as gas carrier (1 ml/min.), and 1.0μL of sample was injected. The detector was Mass detector Turbomass gold Perkin Elmer. The total running time for GC was 36 min. and software Turbomass 5.2.0 was used in this GC-MS study (Manjamalai et al., 2010).

2.3. Identification of compounds

All the compounds were identified from methanol extracts based on direct comparison of the retention times and their mass spectra with the spectra of known compounds stored in the spectral database, National Institute Standard and technology (NIST) (Version year 2005).

Table 1. Phytocompounds identified from the methanolic leaf extract of M. edule. (Acc.1. Authukurichi, Acc.2. Puthupatu)

| Sl.No. | Compound name                      | Formula     | Mol. weight | % of peak area | % of peak area |
|-------|------------------------------------|-------------|-------------|----------------|---------------|
| 1     | Furval                             | C₆H₁₀O₂     | 96          | 5.9599         | 1.5145        |
| 2     | 2-Cyclopenten-1-one, 2-hydroxy-    | C₆H₁₀O₂     | 98          | 0.3292         |               |
| 3     | 1-Benzoyl-3-amino-4-cyano-3-pyrrrole | C₁₂H₁₁N₃O   | 213         | 0.8871         |               |
| 4     | 4(3H)-Furanone, 3-acetlyldihydro-  | C₆H₁₀O₃     | 128         | 0.2274         |               |
| 5     | Phenternino-propionyl              | C₁₃H₁₉NO    | 205         | 0.6349         |               |
| 6     | cis-1,2-Dihydrocatechol            | C₆H₁₀O₂     | 112         | 0.392          |               |
| 7     | 1,2-Butanediol, 1-phenyl-          | C₁₀H₁₄O₂    | 166         | 4.2074         |               |
| 8     | Hydouracil, 1-methyl-              | C₅H₆N₄O₂    | 128         | 0.9593         |               |
| 9     | Methyl 2-furoate                   | C₆H₁₀O₃     | 126         | 0.8868         |               |
| 10    | Levoglucosenone                    | C₆H₁₀O₃     | 126         | 2.2612         | 0.179         |
| 11    | 1-Deoxy-d-altitol                  | C₆H₁₀O₅     | 166         | 0.224          | 0.7361        |
| 12    | 4H-Pyraran-4-one, 2,3-dihydro-3,5- | C₆H₁₀O₄     | 144         | 2.6392         | 1.457         |
| 13    | Benzoic acid, 2-hydroxy-, methyl ester | C₆H₁₀O₃     | 152         | 0.1067         |               |
| 14    | 1,3,4,6-Dianhydro-à-d-glucopyranose | C₆H₁₀O₄     | 144         | 1.4487         | 0.5732        |
| 15    | 2-Furan carboxaldehyde, 5-(hydroxymethyl)- | C₆H₁₀O₃     | 126         | 13.488        |               |
| 16    | 2-Methoxy-4-vinylphenol            | C₉H₁₀O₂     | 150         | 0.3241         |               |
| 17    | Hydroquinone                       | C₆H₁₀O₂     | 110         | 7.3113         |               |
| 18    | Methyl-à-d-ribofuranaside           | C₆H₁₂O₅     | 164         | 0.6927         |               |
| 19    | 1,2,3-Benzenetriol                 | C₆H₁₀O₃     | 126         | 29.278         | 17.066        |
| 20    | 1,3-Cyclohexanediol, 4,6-dimethyl-2-nitro- diacetate (ester), | C₁₂H₁₅N₆O₆ | 273         | 0.3964         |               |
| 21    | Dodecanoic acid                    | C₁₂H₂₄O₂    | 200         | 0.2861         |               |
| 22    | D-Allose                           | C₆H₁₂O₆     | 180         | 15.256         | 16.808        |
| 23    | Benzeneacetic acid, 4-hydroxy-3-methoxy- | C₉H₁₀O₄     | 182         | 2.7237         |               |
| 24    | 2-Cyclohexen-1-one, 4-(3-hydroxybutyl)-3,5,5-trimethyl- | C₁₃H₂₂O₂    | 210         | 1.9662         |               |
| 25    | 3,7,11,15-Tetramethyl-2-hexadecen-1-ol | C₂₀H₄₀O₀    | 296         | 0.6571         | 0.1904        |
| 26    | 3,5-Dimethoxy-4-hydroxyphenylacetic acid | C₁₈H₁₂O₅ | 212         | 0.6745         |               |
| 27    | n-Hexadecanoic acid                | C₁₈H₃₂O₂    | 256         | 5.168          | 9.6491        |
| 28    | cis-9-Hexadecenal                  | C₁₃H₂₈O     | 238         | 0.9771         |               |
| 29    | 2,10-Dodecadien-1-ol, 3,7,11-trimethyl- | C₁₃H₂₈O     | 224         |               | 3.2083        |

3. RESULT AND DISCUSSION

The chemical constituents identified by the GC-MS analysis on methanolic leaf extract of two accessions of Memecylon edule were enumerated along with Molecular Formula (MF), Molecular Weight (MW), Retention Time (RT), and Peak area and Peak area (%) is presented in Table-1. Of which nine compounds present in both the accessions of M. edule and are Furval, Levoglucosenone, 1-Deoxy-d-altitol, 4H-Pyraran-4-one, 2,3-dihydro-3,5-1,4,3,6-Dianhydro-à-d-glucopyranose, 1,2,3-Benzenetriol, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol and n-Hexadecanoic acid. Comparatively 1,2,3-Benzenetriol show higher percentage in both accessions.
Plants serve as vast source for varied phytocompounds exhibiting varied pharmacological property. Identifying such potential plants is of significance in medicine. In this connection, in the present study the methanolic leaf extract of two accessions of *M. edule* contains various phytocompounds. Secondary metabolites have proven to be medicinal in nature. They have various protective and therapeutic effects, which prevent diseases and maintain a state of well-being (Oyetayo, 2007).

These compounds are known to be biologically active. Tannins have been found to form irreversible complexes with proline-rich proteins (Hagerman and Butler, 1981) resulting in the inhibition of the cell protein synthesis. Tannins have important roles such as stable and potent antioxidants (Trease and Evans, 1983). Herbs that have tannins as their main component are astringent in nature and are used for treating intestinal disorders such as diarrhoea and dysentery (Subhuti Dharmananda, 2003). Presence of Hexadecanoic acid, showing Antioxidant, Antiandrogenic, Hypocholesterolemic activities and used as nematicide, pesticide, lubricant, also it is an hemolytic 5'-Alpha reductase inhibitor. Flavonoids have been referred to as nature’s biological response modifiers because of strong experimental evidence of their inherent ability to modify the body's reaction to allergen, virus and carcinogens. They show anti-allergic, anti-inflammatory, anti-microbial and anticancer activity (Cushnie and Lamb, 2005; De Sousa et al., 2007).

Tannins are known to possess general antimicrobial and antioxidant activities (Rievere et al., 2009). Recent reports show that tannins may have potential value as cytotoxic and antineoplastic agents (Aguinaldo et al., 2005). Other compounds like saponins also have anti-fungal properties (Mohanta et al., 2007). Saponins are a mild detergent used in intracellular histochemistry staining to allow antibody access to intracellular proteins. In medicine, it is used in hyper cholesterolama, hyperglycemia, antioxidant, anticancer, anti-

| No. | Compound Description                                             | C₆H₁₀O₅  | 1.0947  | 0.2698  | 4.1995  | 0.3379  | 0.1605  | 10.4099 | 1.7445  | 9.3267  | 2.1644  | 1.5161  | 0.2702  | 0.1516  |
|-----|-----------------------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 30  | 2H-1-Benzopyran-2-one, 7-methoxy-6-(3-methyl-2-oxobutyl)        | C₁₅H₁₆O₄ | 0.2698  |         |         |         |         |         |         |         |         |         |         |         |
| 31  | Octadecanoic acid                                              | C₁₈H₃₆O₂ | 1.0947  |         |         |         |         |         |         |         |         |         |         |         |
| 32  | E-9-Tetradecenoic acid                                         | C₁₄H₂₀O₂ | 4.1995  |         |         |         |         |         |         |         |         |         |         |         |
| 33  | 2H,8H-Benzo[1,2-b:5,4-b']dipyran-2-one, 8,8-dimethyl           | C₁₄H₁₂O₃ | 0.2698  |         |         |         |         |         |         |         |         |         |         |         |
| 34  | Tetradecanoic acid                                             | C₁₄H₂₀O₂ | 0.3379  |         |         |         |         |         |         |         |         |         |         |         |
| 35  | Benzenacetic acid, 4-hydroxy-3-methoxy-3-methyl ester           | C₁₆H₁₂O₄ | 0.1605  |         |         |         |         |         |         |         |         |         |         |         |
| 36  | 1,6-Anhydro-à-d-Galactofuranose, 7-Oxabicyclo[4.1.0]heptane,    | C₆H₁₀O₅  | 10.4099 |         |         |         |         |         |         |         |         |         |         |         |
| 37  | (1,3-dimethyl-1,3-butadienyl)-2,2,6-trimethyl- (E)-              | C₁₅H₂₄O  | 1.7445  |         |         |         |         |         |         |         |         |         |         |         |
| 38  | 1-Hydroxy-6-(3-isopropenyl-cycloprop-1-etyl)-6-methyl-heptan-2-one | C₁₄H₂₂O₂ | 0.14    |         |         |         |         |         |         |         |         |         |         |         |
| 39  | 2-Methoxy-4-vinylphenol                                        | C₉H₁₅O₂  | 0.1694  |         |         |         |         |         |         |         |         |         |         |         |
| 40  | 2-Furancarboxaldehyde, (hydroxymethyl)-5-                      | C₆H₄O₃  | 9.3267  |         |         |         |         |         |         |         |         |         |         |         |
| 41  | Sucrose                                                         | C₁₂H₂₄O₁₁ | 2.1644  |         |         |         |         |         |         |         |         |         |         |         |
| 42  | 5H-1,4-Dioxepin,2,3-dihydro-2,5-dimethyl-                      | C₇H₁₂O₂  | 1.5161  |         |         |         |         |         |         |         |         |         |         |         |
| 43  | 2(1H)-Pyridinone, 6-hydroxy-                                    | C₅H₃N₂O₂ | 0.2702  |         |         |         |         |         |         |         |         |         |         |         |
| 44  | 2-Ethylacrolein                                                | C₂H₄O₀  | 0.1516  |         |         |         |         |         |         |         |         |         |         |         |

Fig. 1. GC-MS Chromatogram of methanolic leaf extract of *M. edule* (Acc.1. Authukurichi).

Fig. 2. GC-MS Chromatogram of methanolic leaf extract of *M. edule* (Acc.2. Puthupattu).
inflammatory and weight loss, etc. It is also known to have anti-fungal properties (De-Lucca et al., 2005). Saponins have been implicated as bioactive antibacterial agents of plants (Mandal et al., 2005; Manjunatha, 2006). Plant steroids are known to be important for their cardiotonic activities, possess insecticidal and anti-microbial properties. Plant derived natural products such as flavonoids, terpenoids and steroids etc have received considerable attention in recent years due to their diverse pharmacological properties including antioxidant and antitumor activity. Phenolic phytochemicals have antioxidative, antidiabetic anticarcinogenic, antimicrobial, antiallergic, antimutagenic and anti-inflammatory (Arts and Hollman, 2005; Scalbert et al., 2005). The present report correlates along with the above bioactivities and phytocompounds by the earlier reports in the leaf extracts of Memecylon umbellatum (Murugesan et al., 2011; Bharathi et al., 2015).

4. CONCLUSION

The presence of various bioactive compounds present in the leaves of M. edule justifies the use of for various ailments by traditional practitioners. However, isolation of individual phytochemical compound will subjecting it to biological activity will definitely give fruitful results. It could be concluded that Memecylon edule contains various bioactive compounds. However, further studies will need to be undertaken to ascertain fully its bioactivity, toxicity profile, effect on the ecosystem and agricultural products.

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