



Isolation of three chemical constituents of *Mangifera indica* wood extract and their characterization by some spectroscopic techniques

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Abstract: *Mangifera indica*, commonly called Mango or Amra belongs to a family of Anacardiaceae. The plant is used as antiasthmatic, antiseptic, antiviral, emetic, expectorant and laxative. It is cultivated in the Indian subcontinent for thousands of years from where it travelled to East Asia between the 5th-4th century BC. Later by the 10th century AD it was transported to East Africa and subsequently to Brazil, West Indies and Mexico. It is an important medicinal plant used in various Ayurvedic preparations. Scientific investigations have shown that the mango triterpene, lupeol is an effective inhibitor in laboratory models of prostate and skin cancers. Extract of its branch bark in water contains numerous polyphenols with anti-oxidant properties. Mango wood is used in yagya as base fire through which medicated smoke is produced. Extract of mango leaves are astringent, cooling, antiemetic and useful in hyperacidity, burning sensation, dysentery and fever. The ash of leaves is used for wound healing properties in burns and scalds. The leaves of mango are kept in the kalash during puja rituals and are known as leaves of deity's seat. Flowers of mango are acrid, and are useful in diarrhoea and anaemia. In Fiji, fresh mango kernels are consumed as a cure for dysentery and asthma, while mango juice is used as a nose drop for sinus trouble. In India, dry seed powder is applied to the head to remove dandruff. It is also applied as an antidiarrheal agent. Kernel starch is eaten as a famine food, while hot water extracts of kernel are administered as antihelminthic, laxatives and tonics. We have isolated three new compounds from alcoholic and hexane extracts. 1,2-benzenedicarboxylic acid and mono (2-ethylhexyl)ester 9,12-tetradecadiene-1-ol-acetate were separated from the hexane extract of the stem bark of *Mangifera indica*. On the other hand alcoholic extract 3-chloro-N-(2-phenylethyl) propanamide. These were first identified by thin layer chromatography and later separated in a silica gel column. All the compounds gave characteristic infrared bands corresponding to functional groups. The structures were elucidated by GC-MS fragmentation pattern after comparing the data with NIST mass spectral data base.

Key Words: Mango, *Mangifera indica*, amra, chemical constituents, GC-MS

I. Introduction

Mango which belongs to family Anacardiaceae, order rutales, is one of the most important fruit marketed in the world with global production exceeding 26 million tons in 2004¹. It grown naturally or cultivated mainly in tropical and sub tropical regions and has been reported to be the second largest tropical fruit crop in the world.²

Extract of *Mangifera indica* have been reported to possess antiviral, antibacterial, analgesic, anti-inflammatory and immuno-modulatory activities³, in-vitro antamoebic activity⁴, interesting α -amylase and α -glucosidase inhibitory activities⁵ and cardio toxic and diuretic properties⁶.

The chemical constituents of the different organs of *M. indica* are reviewed in Ross (1999)⁷ and Scartezzone and Speroni (2000). The bark is reported to contain protocatechic acid, catechin, mangiferin, alanine, glycine, γ -amino-butyric acid, kinic acid, shikimic acid and the tetra cyclic triterpenoids cycloart-24-en-3 β ,26-diol, 3-keto dammar-24(ES-en-2O), 26-di ol, C-24 epimers of cycloart-25 en 3 β ,24,27-triol and cycloartan- 3 β , 24,27-triol.⁸

Present work was an attempt to isolate and identify new organic compound from the hexane and alcoholic extract of *Mangifera indica* L. These were identified by IR spectral and Gas Chromatography-Mass spectrometry.

II. Experimental Sampling

The dried stem of *Mangifera indica* were collected from the garden of Shantikunj. They were thoroughly washed with distilled water to remove any dirt and other surface contamination. Finally, they were dried 80°C for 24 hours in an oven and crushed to homogeneous powder (80 mesh).

Separation and identification of organic constituents:

500 g air-dried powder were first extracted with n-hexane in a soxhlet for 48 hours the solvent was removed and the residue (15g) was kept aside. Now, the extracted powder were dried and re-extracted with methanol in soxhlet for 30 hours. Again, the solvent was removed and the residue (13g) was collected.

The n-hexane extract was subjected to column chromatography and eluted with solvent of their increasing polarity order such as hexane, CCl₄, benzene, CH₂Cl₂, CHCl₃, EtOAc, and CH₃OH respectively. The fractions were collected and the benzene fraction was chromatographed over silica gel-G eluting with benzene and increasing proportion of EtOAc in benzene. Elution with benzene-EtOAc (6:1) gave two distinct spots corresponding to R_f=.56 and R_f=.43 obtained that was separated by column chromatography.

Again TLC was checked for methanolic extract in different solvent mixture but only Benzene:CCl₄ mixture showed five distinct spots corresponding to R_f=.21,.36,.52,.77,.84 respectively. Finally, only one was separated through column chromatography.

III. Results and discussion

Three new compounds two from hexane extract and one from methanol extract were separated and identified by GC-MS fragmentation assignments after comparing the data with NIST mass spectral data base. The compounds are 1,2 benzenedicarboxylic acid, mono(2-ethylhexyl)ester (rs-1); 9,12-Tetradecadiene,1-ol,acetate (rs-11) and 3-chloro-N-(2-phenylethyl) propanamide (rs-0) that is used as antimalarial⁹. It may be noted that rs-1 is an allelopathic compound that reduces the need for weed management in other crops¹⁰ and already reported in curry leaves¹¹.

Rs-1 was identified as 1,2-benzenedicarboxylic acid, mono(2-ethylhexyl)ester from the IR and mass spectral bands. A band for hydroxyl group, -OH (3441.76) cm⁻¹ can be observed indicating the presence of this functional group. The other prominent peaks are seen at 2930 cm⁻¹ (C-H stretch), 1625 cm⁻¹ and 1567 cm⁻¹ (C=O_{carboxylate}), 1631 cm⁻¹ (C-C stretch) and 1383 cm⁻¹ (C-O stretch). The mass spectrum indicated the molecular ion peak at m/z 278 and the base peak at m/z 149. The other prominent peaks are those at m/z 167, 113 and 57.

Rs-11 was identified as 9,12-Tetradecadiene-1-ol-acetate from IR and mass spectral bands. The typical diagnostic band for ester carbonyl group, C=O (1707 cm⁻¹) was observed. The other prominent bands are seen at 2852.86 cm⁻¹ (-CH₃ stretch), 2920.59 cm⁻¹ (-CH₂- stretch), 1461 cm⁻¹ (methylene C-H bend) and 1380 cm⁻¹ (C-O stretch). The mass spectrum showed the molecular ion peak at m/z 252 and the base peak at 55. The other prominent peaks are those at m/z 67, 81, 95, 107, 121, 149, 163 and 192.

IR spectrum for Rs-0 gave prominent bands at 3770, 2925 and 2845, 1680, 1620, 1545 and 1480 cm⁻¹ corresponding to the amide, -CH₂ and carbonyl groups and a band for benzene ring respectively. A molecular ion peak was observed at m/z 211 and the base peak at m/z 104. The other prominent peaks are those at m/z 213, 175, 148, 120, 105, 104, 91, 77, 63, 65, 51 and 49.

Recent reports by some scientists have investigated that an aqueous stem bark extract of *Mangifera indica* (Vimang) exhibits anthelmintic and anti-allergic activities¹² which in turn may be correlated with their organic constituents that may help in developing an understanding for its pharmacological action.

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