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NOTE

Sore-producing chemical constituents of the exudation coming out from the upper part of the ripe fruits of *Mangifera indica* (both "Himsagar" and "Langra" varieties)

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Abstract : From the exudation coming out from the upper part of the ripe fruits of *Mangifera indica* (commonly known as Mango in West Bengal) [both "Himsagar" and "Langra" varieties] were isolated gallic acid as the major compound along with small amounts of ethyl gallate and cholesterol. The sore-producing constituents of the exudation from the aforesaid types of ripe fruits were attributed mostly to gallic acid and partly to ethyl gallate.

Keywords : Exudation from the upper part of the ripe fruits of *Mangifera indica* (both "Himsagar" and "Langra" varieties), gallic acid and ethyl gallate as the sore-producing constituents, cholesterol.

Introduction

Mangifera indica (commonly known as mango tree) is a well known plant in India particularly for the highly delicious fruits that several species of this plant produce. Different parts of this plant were reported[1,2,8a,10] to have various medicinal properties, viz. (i) extracts of leaves, bark, stem and unripe fruits exhibit antibacterial activity against *Micrococcus pyrogenes* var. *aureus*; (ii) leaves are used in scorpion-sting; (iii) unripe fruits are used in ophthalmia; (iv) bark is used in uterine haemourage and other discharges; (v) ripe fruits are laxative and used in haemourage from uterus and intestines; (vi) ripe fruits contain vitamins A, B, C and D; (vii) antifungal microorganisms were reported in ripe mango.

Chemically, *Mangifera indica* is also a rich store-house of a wide range of compounds[3-9] comprising flavonoids and other polyphenolics, simple phenolic compounds, tetra- and pentacyclic triterpenoids of different skeletal structures, mono- and polysaccharides etc. Almost all parts of this plant have been chemically investigated except the thick exudation coming out from the upper part of ripe fruits. Among the ripe mango (*Mangifera indica*) fruits, both "Himsagar" and "Langra" varieties are highly delicious and are very much liked by the Indian people. But the exudation coming out from the upper part of the ripe fruits through the point of attachment of the fruits with the stalks of each variety causes severe sores on the lips, tongue and other parts of the buccal cavity, if taken without sufficiently washing the fruits with water. The intensity of irritation is, however, considerably reduced, if thin slices are cut out from the upper part of the fruits and kept immersed in water for an hour or so. This has prompted us to chemically investigate the exudation with a view to identifying the sore-producing constituent(s) of both "Himsagar" and "Langra" varieties of ripe mango fruits.

Results and discussion

Thick exudation coming out from the upper part of the ripe fruits of both "Himsagar" and "Langra" varieties (each 14 kg) after cutting out thin slices from the upper part centering the point of attachment of the fruit with the stalk and rubbing against the open area was separately collected by washing with EtOH. The ethanolic extract of the total exudation from all the fruits of each variety was separately concentrated under reduced pressure, diluted with water and extracted with EtOAc, dried and the solvent removed. The residues were separately

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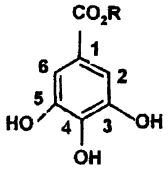
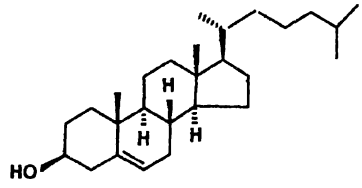
triturated with $CHCl_3$ to give gallic acid (**1a**), in each case, as a white solid as the major compound. The extracts, after filtration of gallic acid, were separately chromatographed over silica gel to give cholesterol (**2**) and ethyl gallate (**1b**) as minor products in each case. From the nature of the compounds isolated it may be concluded that the sore-producing chemical constituents of the ripe fruits of both "Himsagar" and "Langra" varieties is mostly gallic acid and partly ethyl gallate. Gallic acid containing a carboxylic group and three phenolic hydroxyl functions is primarily responsible for producing sores on the lips and other parts of the buccal cavity. Again, gallic acid being fairly soluble in water, the intensity of irritation is considerably reduced, if the fruits are kept immersed in water for an hour or so after cutting out thin slices from the upper part. Gallic acid was, however, also reported from other parts of *Mangifera indica*.



1a : R=H

1b : R=Et



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Experimental

Thin slice was cut from the upper part centering the point of attachment of the fruit with the stalk of each ripe mango (*Mangifera indica*) fruit of both "Himsagar" [50 fruits (14 kg)] and "Langra " [55 fruits (14 kg)] varieties. The slices thus cut out from each type of fruits were rubbed against the surface of the open area and the thick exudation that came out was thoroughly washed with EtOH. This was done until no more exudation came out after rubbing. The combined EtOH washings from all the mangoes of each variety were separately collected and concentrated to about 50 ml, diluted with H_2O (25 ml) and exhaustively extracted with EtOAc, dried and the solvent removed. The residues were separately triturated with $CHCl_3$ to give white solids which were filtered and separately crystallized from EtOAc-petrol to give gallic acid (**1a**), m.p. 260 °C (dec.), identified by direct comparison (TLC and superimposable IR spectra) [2.8 g from the "Himsagar" variety; 1.12 g from the "Langra" variety] with an authentic sample.

The filtrates after separation of gallic acid in both the cases were separately chromatographed over silica gel. The petrol-EtOAc (20 : 1) eluate afforded a white solid, in each case, crystallized from MeOH, m.p. 148 °C [0.01 g from the "Himsagar" variety; 0.008 g from the "Langra" variety]. This was identified as cholesterol (**2**) by direct comparison (TLC, m.p., m.m.p. and superimposable IR spectra) with an authentic sample. Further elution of the columns in both the cases with petrol-EtOAc (3 : 1) gave ethyl gallate (**1b**) [0.14 g from the "Himsagar" variety; 0.098 g from the "Langra" variety] as a semisolid mass; ^1H NMR (300 MHz) : δ 1.29 (3H, t, *J* 7.10 Hz) and 4.23 (2H, q, *J* 7.10 Hz) [$-CO_2CH_2CH_3$], 7.11 (2H, s; H-2 and H-6) and 8.16 (3H, br. signal; ArOH); ^{13}C NMR (75.5 MHz) : δ_c 167.0, 61.0 and 14.8 ($-CO_2CH_2CH_3$), 110.2 (C-2 and C-6), 123.0 (C-1), 139.9 (C-4) and 146.2 (C-3 and C-5); MS [direct inlet system; 70 eV] (rel. int.) : 198 [M^+] (55), 170 (30), 153 (100), 125 (35), 97 (50), 83 (60), 69 (85) and 57 (90).

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