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GCMS analysis of phytocomponents of *C. papaya* variety red lady

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Abstract
Papaya (*Carica papaya* L.), is a fruit plant that belongs to the family of Caricaceae. The various varieties of papaya have been grown in India differing in their flesh colour, skin colour and size. The Papaya Variety, Red Lady (RL) is normally grown in India with good productivity. The current study was aimed to evaluate the phytochemical components of this variety. Methanolic extract prepared from fresh leaves RL was used for phytochemical component study using single quadrapole GCMS system of Agilent Technology. The Automated Mass Spectral Deconvolution and Identification System (AMDIS) software [National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA] was used for target component library (TCL) file generation, which was final report file for study of RL for phytochemical detection. The present GCMS profiling of RL revealed presence of different metabolites.

Keywords: GCMS, phytocomponents, leaf extract, *Carica papaya*, RL

Introduction
Papaya (*Carica papaya* L.), is a fruit plant that belongs to the family of Caricaceae. It is a large perennial herb with a rapid growth rate that originates from Central America. Brazil, Indonesia, Mexico and Nigeria are the leading papaya growing countries in world. India is one of the leading producers of Papaya among 57 different countries of the tropical and sub-tropical regions of the world. The various varieties of papaya have been grown in India such as: Arka Surya, Arka Prabhath, Pusa Majesty, Pusa Delecious, Pusa Dwarf, Pusa Nanha, Coorg Honey Dew, Arka Surya, Solo, Red lady, Ranchi, CO.2, CO.5, CO.7, CO.6, and Barwani etc. All these varieties differ in their flesh colour, skin colour and size.
Papaya is rich in a number of nutrients and antioxidants and has a high medicinal value. Papaya contains provitamin a, carotenoids, vitamin C, vitamin B, lycopene, dietary minerals and dietary fibres therefore it is considered as a rich source of nutrients. Papaya peel is also used in cosmetics. The papaya latex is antimicrobial, anthelmentic, antimalarial, antifungal, antiamoebic, hepatoprotective, male and female antifertility, and immunomodulatory and against histaminergic [1].
The papaya leaves possess medicinal properties as it include active compounds like carpaine, pseudoscorpion and dehydrocarpaine I and II, choline, carposide, vitamin C and carotenoids namely β- carotene, lycopene, anthraquinones, glycosides. Since beginning the juice obtained from the tender leaves of papaya has been used in India as a home remedy to cure Dengue fever. At present, Papaya leaf extracts are available in the market as capsules for consumption. The leaves, seeds and the latex of the papaya are used to cure digestive problems. Papaya contains the protein digesting enzyme papain which stimulates natural digestion [2].
The "Red Lady" papaya (Carica papaya "Red Lady") is a high-yielding Mexican variety that can produce 50 to 120 fruits per plant each season. It is highly susceptible to the papaya ring spot virus.

Materials and Methods
Collection of plant material
Fresh leaves of *C. papaya* variety Red Lady (RL) were collected from the trial field established by IARI regional station located at Aundh, Pune, Maharashtra.

Preparation of plant extracts
The collected plant leaves were air dried and ground into uniform powder for extraction using methanol (HPLC Grade). Leaf extract (50 mg/ ml w/v) was filtered through micropore milifilter of size 0.22 µm. The 1µl of this extract was used for GC-MS analysis.

GC-MS analysis

Single quadrapole Agilent 5975C GCMS with triple-axis detector was used with Chemstation software for analysis (Agilent). Total run time for each sample cycle was 28min. Helium was used as carrier gas at a flow rate of 1 mL min^{-1} using the HP-5MS column. Initially temperature of the GC oven was set at 50 °C for 1min, then increased by 5 °C min^{-1} till 100 °C held for 1 min. Lastly temperature increased by 15 °C min^{-1} to 325 °C. Current ionization of 2.0 mA with Electron impact (EI) mode (70 eV) used for MS detection and full scan monitoring (m/z 50–600 amu) was done. Spectra were recorded at 1.562 scans per second with frequency of 2.7 scans per second. The transfer line and electron ionization (EI) were set at 250 °C and 230 °C, respectively while the MS quadrapole kept at 150 °C. The mass spectral deconvolution and aided in peak picking and identification was done using the Automated Mass Spectral Deconvolution and Identification System (AMDIS) software [National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA]. Generated target component library (TCL), which was final report file for study of RL for phytochemical detection.

Results and Discussions

Table 1 and Fig. 1 showed the presence of twenty phytocomponents in RL in 28 min cycle. The major phytocomponents present in RL in terms of their relative abundance were Benzyl nitrile; Pyridine-2-d, 6-methyl-; 1,1'-Dimethyl-2'-propenyl Benzoylformate;Osmium,[methyl2-(1,1-dimethylethyl)-4,5-dihydroxy-3xazolidinecarboxylato(2-4,O5]dioxobis(pyridine),[OC644[2R(2.alpha.,4.beta.,5.beta.); 6(N,N Diethylaminomethyl)-2,5-dimethylphenol and Benzene,(isothiocyanatomethyl) which corresponded to 47.05%, 9.84%, 8.51%, 5.87% 5.58% and 4.42% relative abundance respectively. The minor phytocomponents present in RL have a narrow range of relative abundance from 0.48-3.84%. The Retention time, 12.842 min was detected for Benzyl nitrile which has highest % pick area and 4.699 min of retention time was observed for Pyridine-2-d, 6-methyl-; 1,1'-Dimethyl-2'-propenyl Benzoylformate which has second highest % pick area. R)-16-Hydroxy-3-methylhexadecanoic acid and Tetracosanoic acid, methyl has 6.814 and 22.001 min retention time and 0.61 % and 0.79% pick area respectively. Last pick was observed at 27.889 min for 2-(1',3'-Dioxolan-2'-yl)-2-phenylpropanol with 3.84% pick area.

Findings from previous studies on the papaya leaves contain active compounds like carpaine, pseudoscorpion and dehydrocarpaine I and II, choline, carposide, vitamin C and E which have health benefits. Both leaf and fruit of the *C. papaya* possess carotenoids namely β- carotene, lycopene, anthraquinones, glycosides as compared to matured leaves and hence possess medicinal properties like anti-inflammatory, hypoglycemic, antifertility, abortificient, hepatoprotective, wound healing, recently its antihypertensive and antitumor activities. The presence of carpaine in leaves of papaya explains the reason why it is being effectively used as an antimalaria agent [3]. Tetradecanoic acid has the major antibacterial and antioxidant as well as antibacterial properties revealed from study of *Myristica fragrans* (nutmeg) and from *P. capillacea* [4, 5]. The study showed that Benzyl group of phytocomponents need to study for their biological activities in Papaya. Papaya Ring Spot Virus disease mostly found in RL so phytocomponents in relation to Pathogen interaction need to study in details. The present GCMS profiling of RL revealed presence of different metabolites.

The phytocomponents or analogs of the phytocomponents present in PM of C. papaya observed from the studies done using GC–MS analysis. Octadecanoic acid, 2,3-dihydroxypropyl ester, hexadecanoic acid, 2,3-dihydroxypropyl ester has been exhibited antibacterial activity in marine red seaweeds [6]. Methanolic leaf extracts of *Justicia*, *Adhatoda* and *Clerodendrum viscosum* showed presence of n-hexadecanoic acid [7, 8]. Antioxidant activity of The n-hexadecanoic acid, like its ester derivative also serve as anti-cancer, anti-microbial, anti-haemolytic, anti-diabetic agents in addition to causing pesticidal inhibitory action to 5-α reductase activity [3, 9]. Tetradecanoic acid has the major antibacterial and antioxidant as well as antibacterial properties revealed from study of *Myristica fragrans* (nutmeg) and from *Pterocladiella capillacea* [4, 5, 10, 11]. The present study showed that Benzyl nitrile was a major phytocomponent present in RL of *C. papaya*, which need to study for their biologic activities in papaya. The present GCMS profiling of RL variety of *C. papaya* revealed presence of variety of metabolites. Further study need to know about their biological and medicinal activities as well as mode of action of detected phyocomponents. Also Benzene and related phyocomponents present in RL need to study with respect to plant-pathogen interaction. Finally, a corresponding GC–MS assisted phytocomponent profiling should be carried out in different extracts to known more phytocomponents present in RL.

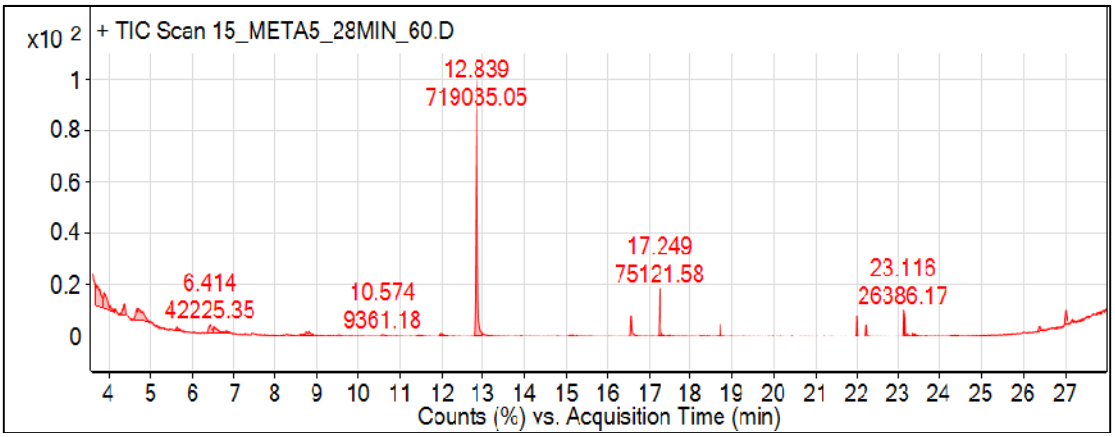

Fig 1: Gas chromatogram of RL of Carica papaya

Table 1: Phytocomponents detected RL of *Carica papaya*. RT-Retention Time, MF- Molecular formula, MW- Molecular Weight, m/z – mass /charge ratio, PA – peak area

Sr. no	RT	Phytocomponents	MF	MW	m/z	%PA
1	3.605	Osmium, [methyl 2-(1,1-dimethylethyl)-4,5-dihydroxy-3-oxazolidinecarboxylato(2-)-O4,O5]dioxobis(pyridine)-, [OC-6-44-[2R-(2.alpha.,4.beta.,5.beta.)]]-	$C_{19}H_{25}N_3O_7OS$	597	79	5.87
2	3.641	1,1'-Dimethyl-2'-propenyl Benzoylformate	$C_{13}H_{14}O_3$	218	77	8.51
3	3.883	6-(N,N-Diethylaminomethyl)-2,5-dimethylphenol	$C_{13}H_{21}NO$	207	58.1	5.58
4	4.156	1H-Tetrazol-5-amine, 1-(2-deoxy-.beta.-D-erythro-pentofuranosyl)-N-(1,1-dimethylethyl)-	$C_{10}H_{19}N_5O_3$	257	57	0.84
5	4.344	4-Phenyl-2-[2-(p-toluenesulfonyl)-hydrazino]-thiazole	$C_{16}H_{15}N_3O_2S_2$	345	102	2.82
6	4.699	Pyridine-2-d, 6-methyl-	C_6H_6DN		94.1	9.84
7	4.799	3-Chloro-1,8,8-trimethyl-6-oxo-2,7-diazabicyclo-[3.2.1]oct-3-ene-4,5-dicarbonitrile	$C_{11}H_{11}ClN_4O$	250	207	0.76
8	5.651	2,2-Bis[2-hydroxymethyl-2,3-dihydrobenzo[b]thiophene]disulfide	$C_{18}H_{18}O_2S_4$	394	165	0.48
9	6.415	labeled benzaldehyde	C_7H_6O	106	108.1	2.39
10	6.53	(3R,3'S)-3,3'-Bimorpholine	$C_8H_{16}N_2O_2$	172	86	0.83
11	6.814	R)-16-Hydroxy-3-methylhexadecanoic acid	$C_{17}H_{34}O_3$	286	55	0.61
12	8.798	Methyl 2,4-dichloro-2-methyl-1,13-tridecandioate	$C_{16}H_{28}Cl_2O_4$	355	122	0.56
13	12.842	Benzyl nitrile	C_8H_7N		117.1	47.05
14	16.556	4-vinyl-2-methoxy-phenol	$C_9H_{10}O_2$	150	150	2.02
15	17.248	Benzene, (isothiocyanatomethyl)-	C_8H_7NS	149	91	4.42
16	18.711	Dimethyl 2,2-dioxo-1-(3,4-difluorobenzoyl)-5-methyl-1H,3H-pyrrolo[1,2-c][1,3]thiazole-6,7-dicarboxylate	$C_{18}H_{15}F_2NO_7S$	427	141	0.48
17	22.001	Tetracosanoic acid, methyl	$C_{25}H_{50}O_2$	382	74	0.79
18	23.118	Cyclobutene, 1-methyl-3-propyl-	C_8H_{14}	110	67	1.06
19	23.162	4-(Methoxymethyl)-1-methylenecyclohexane	$C_9H_{16}O$	140	79	1.12
20	27.889	2-(1',3'-Dioxolan-2'-yl)-2-phenylpropanol	$C_{12}H_{16}O_3$	208	73.1	3.84

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References

1. Ezekwe SA, Chikezie PC. GC–MS Analysis of Aqueous Extract of Unripe Fruit of Carica papaya. J Nutr Food Sci 2017; 7:602.
2. Nayak BS, Pereira LP, Maharaj D. Wound healing activity of *Carica papaya* L. in experimentally induced diabetic rats. Indian J Exp Biol. 45:739-743.
3. Gnanavel V, Saral AM. GC-MS analysis of petroleum ether and ethanol leaf extracts from *Abrus precatorius* Linn. Int J Pharm Bio Sci. 2013; 4(3):37-44.
4. Narasimhan B, Dhake AS. Antibacterial principles from *Myristica fragrans* seeds. Journal of medicinal food. 2006; 9(3):395-399.
5. Gupta AD, Bansal VK, Babu V, Maithil N. Chemistry, antioxidant and antimicrobial potential of nutmeg (*Myristica fragrans* Houtt). Journal of Genetic engineering and Biotechnology. 2013; 11(1):25-31.
6. El-Din SMM, El-Ahwany AM. Bioactivity and phytochemical constituents of marine red seaweeds (*Jania rubens*, *Corallina mediterranea* and *Pterocladia capillacea*). Journal of Taibah University for Science. 2016; 10(4):471-484.
7. Jayapriya G, Shoba FG. GC-MS analysis of bio-active compounds in methanolic leaf extracts of *Justicia adhatoda* (Linn.). Journal of Pharmacognosy and Phytochemistry. 2015; 4(1):113-117.
8. Ghosh G, Panda P, Rath M, Pal A, Sharma T, Das D. GC-MS analysis of bioactive compounds in the methanol extract of *Clerodendrum viscosum* leaves. Pharmacognosy Research. 2015; 7(1):110.
9. Gomathi D, Kalaiselvi M, Ravikumar G, Devaki K, Uma C. GC-MS analysis of bioactive compounds from the whole plant ethanolic extract of *Evolvulus alsinoides* (L.) L. Journal of Food Science and Technology. 2015; 52(2):1212-1217
10. Agoramoorthy G, Chandrasekaran M, Venkatesalu V, Hsu MJ. Antibacterial and antifungal activities of fatty acid methyl esters of the blind-your-eye mangrove from India. Brazilian Journal of Microbiology. 2007; 38(4):739-742.
11. Islam A, Al-Mamun M, Parvin S, Sarker M, Zaman MK, Farhana P *et al*. Evaluation of antibacterial activities of latex of Caricaceae (*Carica Papaya* L.). Asian J Pharmaco Clin Res. 2015; 8(1):308-311.