VOLUME 8 (SPECIAL ISSUE) 2022

ISSN 2454-3055

Manuscripts under Special issue are published with the Theme
"Modern Perspectives of Biological Sciences"

Guest Editor: Dr. S. Mohanasundaram
Assistant Guest Editor: Dr. S.S. Syed Abuthahir

INTERNATIONAL JOURNAL OF ZOOLOGICAL INVESTIGATIONS

Forum for Biological and Environmental Sciences

Published by Saran Publications, India

International Journal of Zoological Investigations Vol. 8, Special Issue, 7-17 (2022)

International Journal of Zoological Investigations
Contents available at Journals Home Page: www.ijzi.net
Editor-in-Chief: Prof. Ajai Kumar Srivastav
Published by: Saran Publications, Gorakhpur, India

ISSN: 2454-3055

Identification of Medically Important Phytochemicals in Solvent Extracts of *Areca catechu* L. Nut

Ajesh Kumar A., Syed Abuthahir S.S.* and Syed Ali Padusha M.

Department of Chemistry, Jamal Mohamed College (Autonomous), Affiliated to Bharathidasan University, Tiruchirappalli, Tamil Nadu 620020, India

**Corresponding Author*

Received: 4th August, 2022; **Accepted:** 20th August, 2022; **Published online:** 15 September, 2022

https://doi.org/10.33745/ijzi.2022.v08i0s.002

Abstract: Long carboxylic acids, including tetradecanoic acid, dodecanoic acid, and hexadecanoic acid, amongst others, make up the majority of the chemicals found in *Areca catechu* L.nut. This nut was extracted using chloroform, methanol, n-hexane, ethyl acetate, and toluene. Tetradecanoic acid was found to be the predominant component in all of these solvents. The chloroform extract of *Areca catechu* L.nut has a significant amount of methyl tetradecanoate as the predominant component. In the case of extracts made from methanol and toluene, the molecule 9,12-octadecadienoic acid (Z,Z) is also present and serves as the primary constituent. Because it contains long chains of carboxylic acids, *Areca catechu* L. nut has the potential to be used in the medical system as an anti-alkaline agent. These findings bring to light the importance of its potential use. Because it contains such a diverse range of phytochemicals, the use of the *Areca catechu* L. nut in the traditional medical system for the treatment of alkaline injuries may be justifiable.

Keywords: *Areca catechu*, Gas chromatography, Mass spectrometry, Phytochemicals

Citation: Ajesh Kumar A., Syed Abuthahir S.S. and Syed Ali Padusha M.: Identification of medically important phytochemicals in solvent extracts of *Areca catechu* L. nut. Intern. J. Zool. Invest. 8(Special Issue): 7-17, 2022.
https://doi.org/10.33745/ijzi.2022.v08i0s.002

Introduction

Simple synthetic alterations of the naturally occurring chemicals are the basis for today's commonly used pharmaceuticals (Gordon and David, 2013). Plants have the capacity to manufacture chemical compounds that assist in the defence against assault from a broad range of bacteria (Brian and Gwyn, 2008). These chemical compounds help plants fight themselves against microbial attack. Many different substances are examples of secondary metabolites, which are often involved in the process by which plants adapt to various environmental stress circumstances (Akula and Gokare, 2011). Plants are the primary source for the research that leads to the identification of novel items with medical potential that may be used in the creation of new

drugs (Oxenham *et al*., 2002). One or more nations throughout the globe make significant use of medications that are generated from a variety of unique compounds that are found in plants (Hussain *et al*., 2012). India is home to a vast collection of medicinal plants, many of which have been utilised for centuries in traditional medical practises (Sundar *et al*., 2020).

Nut of the *Areca catechu* L. belongs to the family Arecaceae (Staples and Bevacqua, 2006). *Areca* nuts, sometimes known simply as areca, are a kind of nut that are used as a moderate stimulant (Krishnamurthy, 2009). Nut palms of the species *Areca catechu* L. are grown commercially or in plantations for their nuts (Winstock, 2002). It is referenced in the Sanskrit scriptures and has been utilised for a variety of functions, including food, medical, social, and religious (Shwetha *et al*., 2019). The nut of the *Areca catechu* L. tree was traditionally used in medicine for gastrointestinal and dental health, as well as for the stimulation of bowel motions and the eradication of intestinal worms (Bhat *et al*., 2017). The term "phytochemical" refers to the biologically active substances that may be extracted from various plant sections and that play a significant part in either the development of the plant or its resistance to attack by microorganisms (Rajendra *et al*., 2021). The number of individuals throughout the globe who make use of herbal medicines and phytonutrients is steadily increasing (Ekor, 2014). The purpose of this investigation was to evaluate and contrast the GC-MS findings obtained from various solvent extracts of *Areca catechu* L. nut (methanol, ethyl acetate, chloroform, toluene and n- hexane). The investigation into the therapeutic potential of the same will benefit from having this information.

Materials and Methods

Chemicals:

The chemicals (CH3OH, CH3COOCH2CH3, CHCl3, C6H5CH3, and n-C6H14) were obtained from Eswarr Scientific and Co. at Karumandapam, Trichy, India.

Collection and authentification of plant materials:

The sample was gathered in the Kollam District of Kerala, India. The *Areca catechu* plant and the *Areca catechu* L. nut have both been validated by the JNTBGRI in Thiruvananthapuram, Kerala, India, and voucher specimens (Specimen Numbers TBGT/95955 and TBGT/95956) have been deposited at that location.

Method of extraction:

Extraction by Soxhlet is a technique that may be employed for preparative purposes (Zygler *et al*., 2012). A flask that contains the extraction solvents is put above the Soxhlet extractor (Jesen, 2007). Following this step, a condenser is added to the Soxhlet (Ajith *et al*., 2016). The thimble contained the powdered *Areca catechu* L. nut, which was rolled up with high-quality tissue paper and weighed out to be 25 grammes (Vadnere *et al*., 2011). The powdered *Areca catechu* L. nut was put through an extraction process using a Soxhlet apparatus with a variety of solvents selected according to their polarity (Naveen and Maneemegalai, 2010; Okene and Evobuomwan, 2014). The solvent was heated to the point where it refluxed. CH_3OH, $CH_3COOCH_2CH_3$, $CHCl_3$, $C_6H_5CH_3$, and n-C_6H_{14} are the solvents that are used. The solvent vapour ascends via the distillation arm and then rushes into the chamber that houses the solid thimble (Sideeg *et al*., 2018). The procedure was carried up right up to the point when the solution lost all of its colour (Hutke and Rathod, 2021). It was necessary to remove the flask from the apparatus before it could be put into the beaker and evaporated in order to get the various solvent extracts of the Areca catechu L. nut (Redfern *et al*., 2014).

GC - MS analysis:

A combination of two analytical techniques was used that combine the features of gas chromatography (GC), which is used to separate volatile and semivolatile compounds with great resolution, and mass spectroscopy (MS), which gives details of structural information (Moniruzzaman *et al*., 2014). Gas chromatography

mass spectroscopy (GC-MS) is a combination of the two techniques. so that it would not be difficult to recognise them. In order to identify the phyto-components of the *Areca catechu* L. nut, methanol, ethyl acetate, chloroform, toluene, and n-hexane extracts of the nut were analysed by Gas Chromatography–Mass Spectrometry/Mass Spectrometry.

Results and Discussion

The areca nut is the world's fourth most popular narcotic after cigarettes, alcohol, and caffeine (Winstock, 2002). Methane extracts of *Areca catechu* L. nuts have produced the following compounds: Arecoline, dodecanoic acid or its methyl ester, dodecanoic acid, methyl tetradecanoate, tetradecanoic acid, n-Hexadecanoic acid, 9,12-octadecadienoic acid (Z,Z)- or its methyl ester, cis-13-octadecenoic acid or its methyl ester, pentadecanoic acid or its 9,12-Octadecadienoic acid (Z,Z)-, cis-Vaccenic acid, Octadecanoic acid (Table 1, Fig. 1). In the retention time range of 5.96 min to 37.43 min, we found 1,3-O-Benzylidene glyceryl-2-myristate, Z-8-Methyl-9-tetradecenoic acid, 9,12-Octadecadienoyl chloride, (Z,Z), squalene, and -sitosterol. The molecular weights of the compounds ranged from 155 g all the way up to 414 g in total.

Areca catechu L. nut n-hexane extracts were analysed (Table 2; Fig. 2), and the following chemicals were found: nonanoic acid, 3-decenoic acid, (E)-, n-decanoic acid, dodecanoic acid, tridecanoic acid, dodecanenitrile, methyl tetradecanoate, tetradecanoic acid, and tetradecanoic acid. 1-Eicosanol, n-Hexadecanoic acid, cis-Vaccenic acid, Erucic acid, 1-Docosene, Ethanol or 2-(9-octadecenyloxy)-, (Z)-, n-Nonadecanol-1, 10-Heneicosene (c, t), 2-Methyltetracosane, Methoxyacetic Acid, or 4-Tetradecyl Ester are some examples of the following compounds: Z-10-Octadecen-1-ol acetate, (Z)6-Pentadecen-1-ol, Sulfurous acid or butyl heptadecyl ester, Hexadecyl-disparlure, oxirane, and disparlure. In the retention time range of 6.43 min to 32.15 min, the compounds 5-Ergost-8(14)-ene and Cholestan-3-ol or 2-methylene- or (3,5)- were found. The molecular weights of the various compounds ranged anywhere from 158 to 400 g per component.

Ethul acetate extracts of *Areca catechu* L. nuts (Table 3; Fig. 3) have produced the following compounds: Arecoline, 1-Methyl-8-propyl-3 or 6-diazahomoadamantan-9-ol, Dodecanoic acid or methyl ester, Dodecanoic acid, Pentadecanoic acid, Tetradecanoic acid, n-Hexadecanoic acid, Tetradecanoic acid, n-Hexadecanoic acid, Oleic acid, Octadecanoic acid, Eicos-2-octanoic acid or 2'-hexyl- or methyl ester, 9,12-Octadecadienoic acid (Z,Z)-, 9,12,15-Octadecatrienoic acid or 2,3-dihydroxypropyl ester, (Z,Z,Z)-, and squalene were found in the retention time range of 5.94 min to 27.85 min. The molecular weights of the compounds ranged from 155 g all the way up to 410 g in total.

Toluene extracts of *Areca catechu* L. nuts (Table 4; Fig. 4) have produced the following compounds: 4H-Pyran-4-one, 2, 3- dihydro - 3, 5 – dihydroxy – 6 – methyl -, Arecoline, Dodecanoic-acid, Methyltetradecanoate, Tetradecanoic acid, n-Hexadecanoic acid, 9,12-Octadecadienoic-acid (Z,Z)-,1-H. The molecular weights of the compounds ranged anywhere from 144 to 414 g per component.

Areca catechu L. nut chloroform extracts (Table 5; Fig. 5) were analysed, and the following compounds were discovered: 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, n-Decanoic acid, Dodecanoic acid, Tridecanoic acid, Methyl tetradecanoate, Tetradecanoic acid, n-Hexadecanoic acid, cis-Vacce. The retention time for sitosterol might vary anywhere from 4.66 min to 37.43 min. The molecular weights of the compounds ranged anywhere from 144 to 414 g per component.

Tetradecanoic acid was found to be the most abundant component in the extracts of *Areca catechu* L. nut that were made using methanol, n-hexane, ethyl acetate, and toluene.The extracts of methanol and toluene both included significant amounts of a molecule known as 9, 12-

Table 1: Compounds identified in the methanol extract of *Areca catechu* L. nut

S. No.	RT(min)	Name of the compound	Molecular Formula	Molecular Weight	Peak Area %
1	5.96	Arecoline	$C_8H_{13}NO_2$	155	0.176
2	10.24	Dodecanoic acid, methyl ester	$C_{13}H_{26}O_2$	214	0.024
3	10.87	Dodecanoic acid	$C_{12}H_{24}O_2$	200	4.072
4	12.70	Methyl tetradecanoate	$C_{15}H_{30}O_2$	242	4.395
5	13.40	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	19.709
6	15.20	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	2.620
7	15.87	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	13.510
8	17.53	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	$C_{19}H_{34}O_2$	294	5.767
9	17.63	cis-13-Octadecenoic acid, methyl ester	$C_{19}H_{36}O_2$	296	5.309
10	17.98	Pentadecanoic acid, methyl ester	$C_{16}H_{32}O_2$	256	0.750
11	18.35	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	19.709
12	18.44	cis-Vaccenic acid	$C_{18}H_{34}O_2$	282	10.055
13	18.64	Octadecanoic acid	$C_{18}H_{36}O_2$	284	2.766
14	20.56	1,3-O-Benzylidene glyceryl-2-myristate	$C_{24}H_{38}O_3$	374	0.501
15	23.58	Z-8-Methyl-9-tetradecenoic acid	$C_{15}H_{28}O_2$	240	0.118
16	26.18	9,12-Octadecadienoyl chloride, (Z,Z)-	$C_{18}H_{31}ClO$	298	0.194
17	27.87	Squalene	$C_{30}H_{50}$	410	0.379
18	37.43	γ-Sitosterol	$C_{29}H_{50}O$	414	0.981

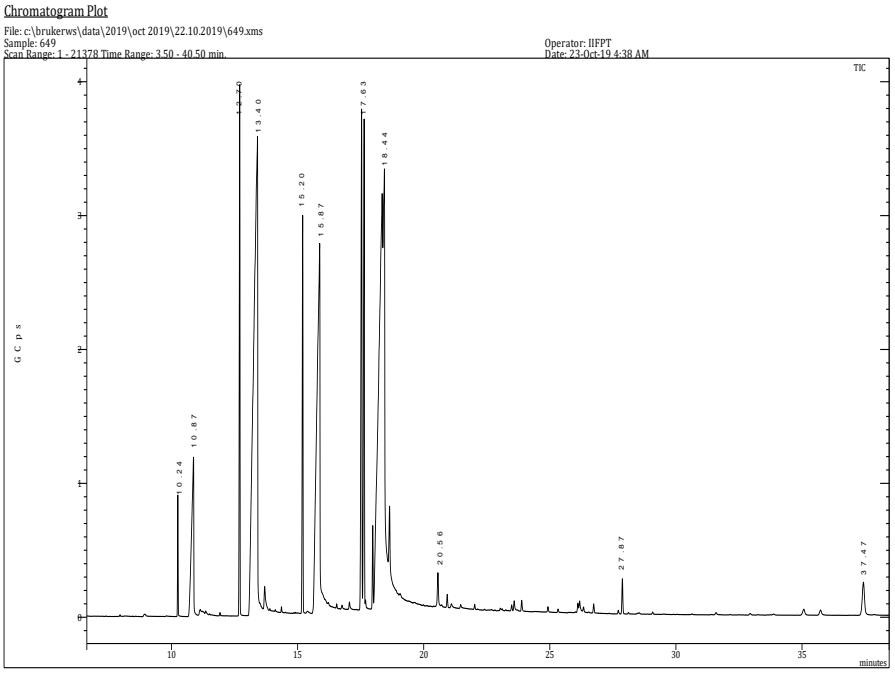

Fig. 1: GC- MS/MS Chromatogram plot of methanol extract of *Areca catechu* L. nut (Arecoline, Dodecanoic acid or methyl ester, Dodecanoic acid, Methyl tetradecanoate, Tetradecanoic acid, Hexadecanoic acid, methyl ester, n-Hexadecanoic acid, 9,12-Octadecadienoic acid (Z,Z)- or methyl ester, cis-13-Octadecenoic acid or methyl ester, Pentadecanoic acid or methyl ester, 9,12-Octadecadienoic acid (Z,Z)-, cis-Vaccenic acid, Octadecanoic acid, 1,3-O-Benzylidene glyceryl-2-myristate, Z-8-Methyl-9-tetradecenoic acid, 9,12-Octadecadienoyl chloride, (Z,Z)-, Squalene and γ-Sitosterol).

Table 2: Compounds identified in the n- hexane extract of Areca catechu L. nut

S. No.	RT(min)	Name of the compound	Molecular Formula	Molecular Weight	Peak Area %
1.	6.43	Nonanoic acid	$C_9H_{18}O_2$	158	0.10
2.	7.86	3-Decenoic acid, (E)-	$C_{10}H_{18}O_2$	170	0.54
3.	8.07	n-Decanoic acid	$C_{10}H_{20}O_2$	172	1.51
4.	10.87	Dodecanoic acid	$C_{12}H_{24}O_2$	200	11.97
5.	11.94	Tridecanoic acid	$C_{13}H_{26}O_2$	214	0.15
6.	12.35	Dodecanenitrile	$C_{12}H_{23}N$	181	0.68
7.	12.70	Methyl tetradecanoate	$C_{15}H_{30}O_2$	242	0.44
8.	13.40	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	42.74
9.	14.69	1-Eicosanol	$C_{20}H_{42}O$	298	0.58
10.	15.87	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	16.03
11.	18.44	cis-Vaccenic acid	$C_{18}H_{34}O_2$	282	1.86
12.	18.69	Erucic acid	$C_{22}H_{42}O_2$	338	8.93
13.	18.80	1-Docosene	$C_{22}H_{44}$	308	3.71
14.	19.98	Ethanol, 2-(9-octadecenyloxy)-, (Z)-	$C_{20}H_{40}O_2$	312	0.39
15.	21.64	n-Nonadecanol-1	$C_{19}H_{40}O$	284	0.83
16.	21.74	10-Heneicosene (c,t)	$C_{21}H_{42}$	294	1.03
17.	22.02	2-methyltetracosane	$C_{25}H_{52}$	352	0.45
18.	23.48	Methoxyacetic acid, 4-tetradecyl ester	$C_{17}H_{34}O_3$	286	0.54
19.	24.18	Z-10-Octadecen-1-ol acetate	$C_{20}H_{38}O_2$	310	0.72
20.	24.31	(Z)6-Pentadecen-1-ol	$C_{15}H_{30}O$	226	0.79
21.	24.92	Sulfurous acid, butyl heptadecyl ester	$C_{21}H_{44}O_3S$	376	0.67
22.	26.04	Disparlure	$C_{19}H_{38}O$	282	0.62
23.	28.82	Oxirane, hexadecyl-	$C_{18}H_{36}O$	268	1.61
24.	31.05	5α-Ergost-8(14)-ene	$C_{28}H_{48}$	384	0.19
25.	32.15	Cholestan-3-ol, 2-methylene-, (3β,5α)-	$C_{28}H_{48}O$	400	2.90

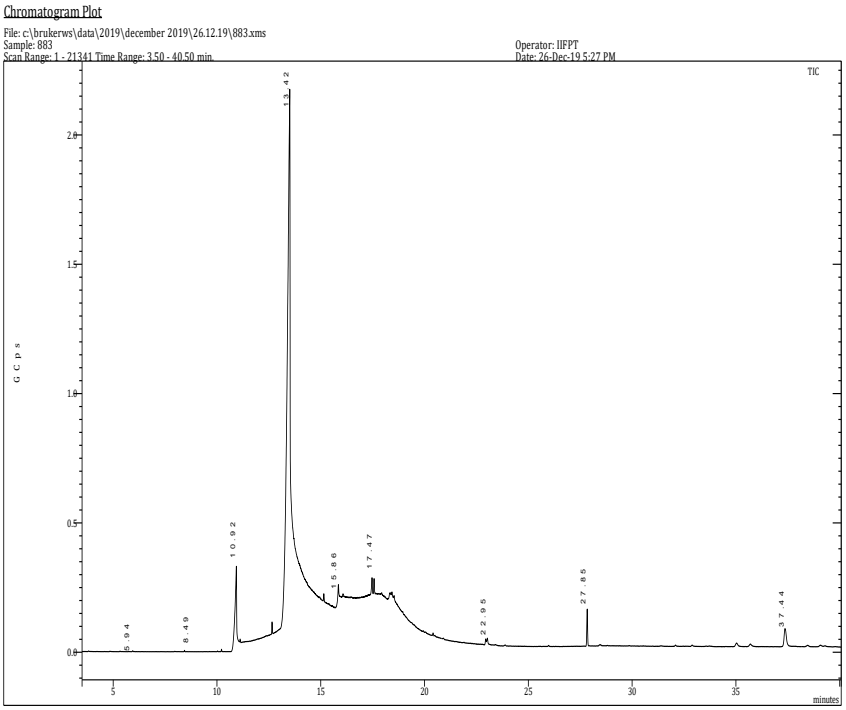

Fig. 2: GC- MS/MS Chromatogram plot of n-hexane extract of *Areca catechu* L. nut (Nonanoic acid, 3-Decenoic acid, (E)-, n-Decanoic acid, Dodecanoic acid, Tridecanoic acid, Dodecanenitrile, Methyl tetradecanoate, Tetradecanoic acid, 1-Eicosanol, n-Hexadecanoic acid, cis-Vaccenic acid, Erucic acid, 1-Docosene, Ethanol or 2-(9-octadecenyloxy)-, (Z)-, n-Nonadecanol-1, 10-Heneicosene (c,t), 2-methyltetracosane, Methoxyacetic acid or 4-tetradecyl ester, Z-10-Octadecen-1-ol acetate, (Z)6-Pentadecen-1-ol, Sulfurous acid or butyl heptadecyl ester, Disparlure, Oxirane, hexadecyl-, 5α-Ergost-8(14)-ene and Cholestan-3-ol or 2-methylene- or (3β,5α)-).

Table 3: Compounds identified in the ethyl acetate extract of *Areca catechu* L. nut

S. No	RT(min)	Name of the compound	Molecular Formula	Molecular Weight	Peak Area %
1	5.94	Arecoline	$C_8H_{13}NO_2$	155	0.02
2	8.49	1-Methyl-8-propyl-3,6-diazahomoadamantan-9-ol	$C_{13}H_{24}N_2O$	224	0.02
3	10.22	Dodecanoic acid, methyl ester	$C_{13}H_{26}O_2$	214	0.04
4	10.92	Dodecanoic acid	$C_{12}H_{24}O_2$	200	4.71
5	12.65	Pentadecanoic acid	$C_{15}H_{30}O_2$	242	0.20
6	13.42	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	90.33
7	15.86	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	0.96
8	17.47	Oleic Acid	$C_{18}H_{34}O_2$	282	0.47
9	17.58	Octadecanoic acid	$C_{18}H_{36}O_2$	284	0.40
10	18.53	Eicosanoic acid	$C_{20}H_{40}O_2$	312	0.26
11	19.93	[1,1'-Bicyclopropyl]-2-octanoic acid, 2'-hexyl-, methyl ester	$C_{21}H_{38}O_2$	322	0.02
12	20.49	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	0.02
13	22.95	9,12,15-Octadecatrienoic acid, 2,3-dihydroxypropyl ester, (Z,Z,Z)-	$C_{21}H_{36}O_4$	352	0.33
14	27.85	Squalene	$C_{30}H_{50}$	410	0.90

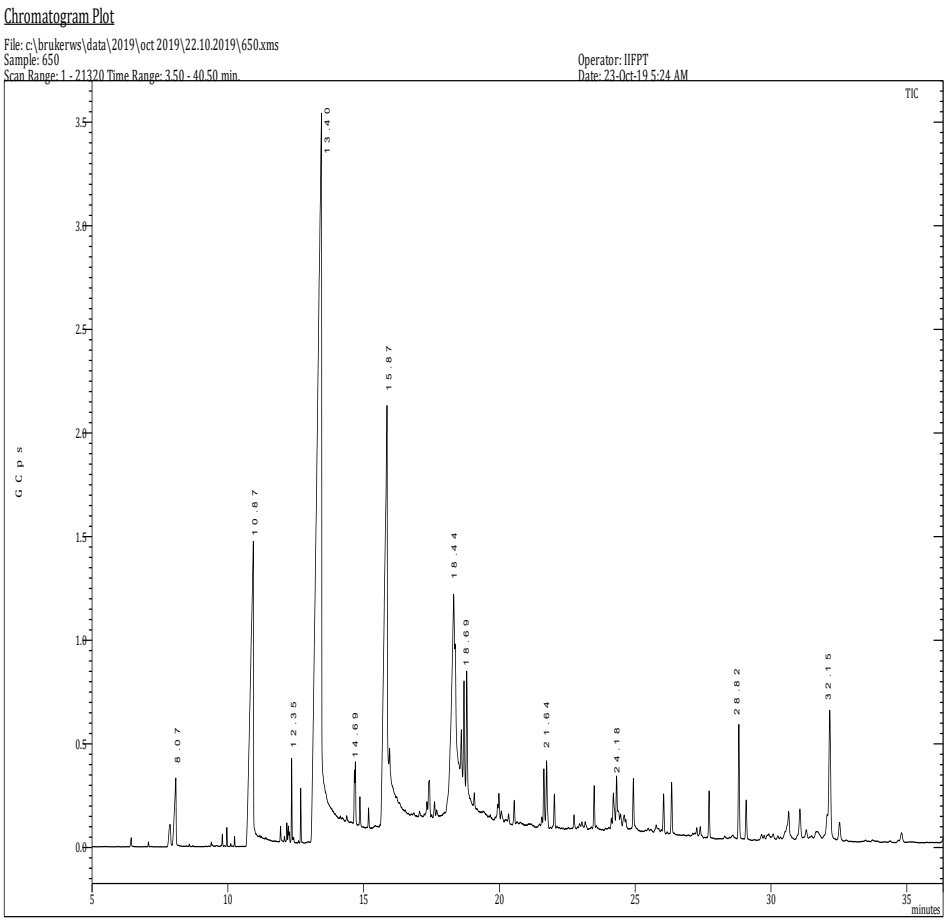

Fig. 3: GC- MS/MS Chromatogram plot of ethyl acetate extract of *Areca catechu* L. nut (Arecoline, 1-Methyl-8-propyl-3 or 6-diazahomoadamantan-9-ol, Dodecanoic acid or methyl ester, Dodecanoic acid, Pentadecanoic acid, Tetradecanoic acid, n-Hexadecanoic acid, Oleic Acid, Octadecanoic acid, Eicosanoic acid, [1,1'-Bicyclopropyl]-2-octanoic acid or 2'-hexyl- or methyl ester, 9,12-Octadecadienoic acid (Z,Z)-, 9,12,15-Octadecatrienoic acid or 2,3-dihydroxypropyl ester, (Z,Z,Z)- and Squalene).

Table 4: Compounds identified in the toluene extract of *Areca catechu* L. nut

S. No.	RT(min)	Name of the compound	Molecular Formula	Molecular Weight	Peak Area %
1.	4.66	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	$C_6H_8O_4$	144	0.12
2.	5.96	Arecoline	$C_8H_{13}NO_2$	155	0.27
3.	10.87	Dodecanoicacid	$C_{12}H_{24}O_2$	200	8.66
4.	12.70	Methyltetradecanoate	$C_{15}H_{30}O_2$	242	12.06
5.	13.40	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	28.09

6.	15.87	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	18.61
7.	18.35	9,12-Octadecadienoicacid(Z,Z)-	$C_{18}H_{32}O_2$	280	28.16
8.	20.55	1-Hexadecanol, 2-methyl-	$C_{17}H_{36}O$	256	0.27
9.	22.02	2-methyltetracosane	$C_{25}H_{52}$	352	0.44
10.	23.48	Methoxyaceticacid, 4-tetradecylester	$C_{17}H_{34}O_3$	286	0.53
11.	26.33	Heptacosane	$C_{27}H_{56}$	380	0.63
12.	27.72	Eicosane, 2-methyl-	$C_{21}H_{44}$	296	0.57
13.	27.87	Squalene	$C_{30}H_{50}$	410	0.53
14.	37.43	γ-Sitosterol	$C_{29}H_{50}O$	414	1.07

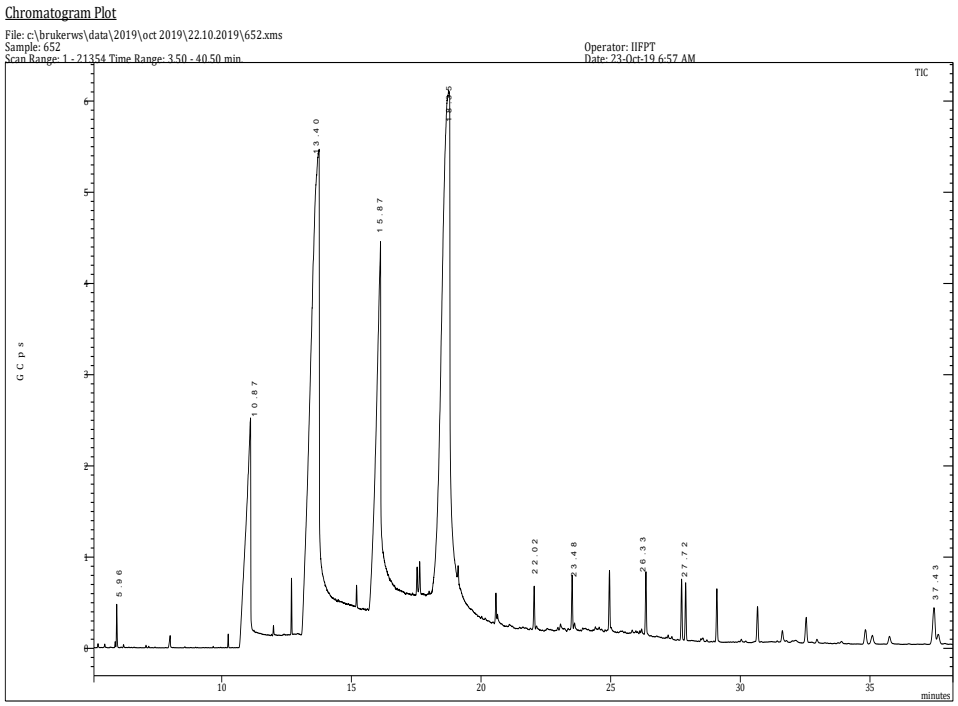

Fig. 4: Chromatogram plot of toluene extract of *Areca catechu* L. nut (4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, Arecoline, Dodecanoicacid, Methyltetradecanoate, Tetradecanoic acid, n-Hexadecanoic acid, 9,12-Octadecadienoicacid(Z,Z)-, 1-Hexadecanol or 2-methyl-, 2-methyltetracosane, Methoxyaceticacid or 4-tetradecylester, Heptacosane, Eicosane or 2-methyl-, Squalene and γ-Sitosterol).

Table 5: Compounds identified in the chloroform extract of *Areca catechu* L. nut

S. No.	RT(min)	Name of the compound	Molecular Formula	Molecular Weight	Peak Area %
1.	4.66	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	$C_6H_8O_4$	144	0.06
2.	8.07	n-Decanoic acid	$C_{10}H_{20}O_2$	172	0.19
3.	10.87	Dodecanoic acid	$C_{12}H_{24}O_2$	200	17.12
4.	11.94	Tridecanoic acid	$C_{13}H_{26}O_2$	214	1.20
5.	12.70	Methyl tetradecanoate	$C_{15}H_{30}O_2$	242	30.63
6.	13.40	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	11.20
7.	15.87	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	0.51
8.	18.44	cis-Vaccenic acid	$C_{18}H_{34}O_2$	282	24.78
9.	18.35	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	8.94
10.	21.64	n-Nonadecanol-1	$C_{19}H_{40}O$	284	0.23
11.	22.07	Dodecane, 2,6,10-trimethyl-	$C_{15}H_{32}$	212	0.63
12.	23.48	Methoxyacetic acid, 4-tetradecyl ester	$C_{17}H_{34}O_3$	286	0.88
13.	24.92	Sulfurous acid, butyl heptadecyl ester	$C_{21}H_{44}O_3S$	376	1.05
14.	26.33	Heptacosane	$C_{27}H_{56}$	380	0.04
15.	27.72	Eicosane, 2-methyl-	$C_{21}H_{44}$	296	1.14
16.	37.43	γ-Sitosterol	$C_{29}H_{50}O$	414	1.38

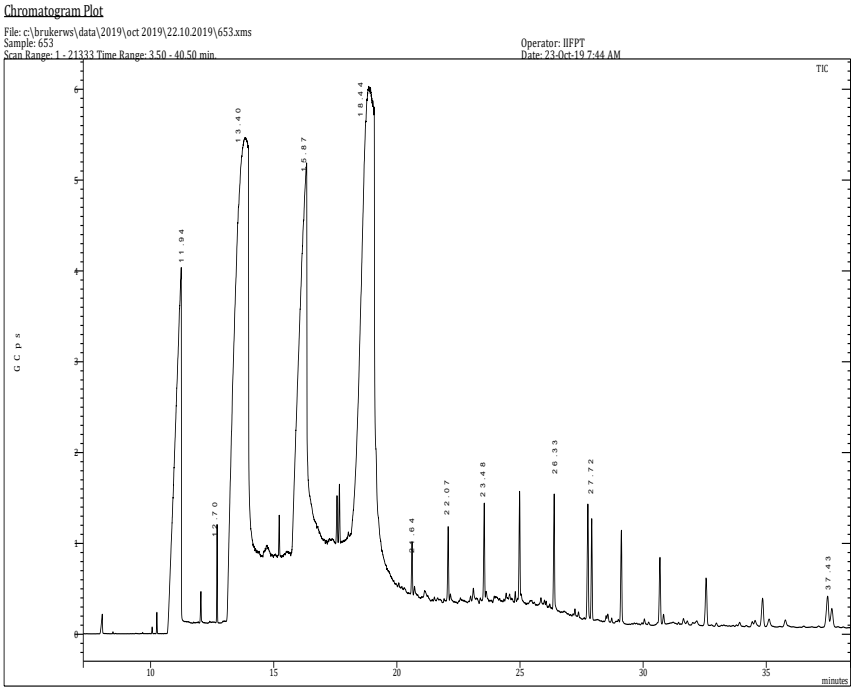

Fig. 5: GC- MS/MS Chromatogram plot of chloroform extract of *Areca catechu* L. nut (4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-, n-Decanoic acid, Dodecanoic acid, Tridecanoic acid, Methyl tetradecanoate, Tetradecanoic acid, n-Hexadecanoic acid, cis-Vaccenic acid, 9,12-Octadecadienoic acid (Z,Z)-, n-Nonadecanol-1, Dodecane, 2,6,10-trimethyl-, Methoxyacetic acid or 4-tetradecyl ester, Sulfurous acid or butyl heptadecyl ester, Heptacosane, Eicosane, 2-methyl- and γ-Sitosterol),

octadecadienoic acid (Z,Z). The majority of the chemicals that have been isolated from the nut of the *Areca catechu* L. tree are long-chain carboxylic acids. These included tetradecanoic acid, dodecanoic acid, and hexa decanoic acid, amongst others. Ayurveda, the ancient medical system of India, makes extensive use of n-hexadecanoic acid-rich medicinal oils for the treatment of rheumatic symptoms (Aparna *et al*., 2012). Palmitic acid not only makes soybean oil more resistant to oxidation, but it also has use in the production of trans-fat-free shortening and margarine, as well as in the cosmetics industry. The ingestion of this saturated short-chain fatty acid, on the other hand, results in an unfavourable lipoprotein profile in blood serum, which is undesirable from a nutritional standpoint (Lakhssassi *et al*., 2017). The chromatogram plots and chemicals that were detected in each of the several solvent extracts of *Areca catechu* L. nut may be found as-- Solvent Delay 0 - 3.5 min and total MS running time: 40.50 min. The use of polyphenolic substances (such as flavonoids, diphenylpropane derivatives, and sesquiterpenes) with potent antioxidant, anti-inflammatory, anti-diabetic, antibacterial, and anticancer properties may be used to treat diabetes, jaundice, ulcer, gastritis, etc. (Pant *et al*., 2017).

Conclusion

Most of the compounds identified in *Areca catechu* L. nut are long – chain carboxylic acids like tetradecanoic acid, dodecanoic acid, hexa decanoic acid, etc. The number of phyto- constituents identified in n- hexane, methanol, chloroform, ethyl acetate and toluene extracts of *Areca catechu* L. nut are 25, 18, 16, 14 and 14, respectively. Thus, the *Areca Catechu* L. nut was found to possess significant phyto-constituents responsible for anti-alkaline activity. The presence of such variety of phyto-chemicals may justify the use of *Areca catechu* L. nut in the system of medicine for treating alkaline injuries. Identification of different chemical compounds in the extracts of *Areca catechu* L. nut will be useful for further studies.

References

Ajith A, Ajantha and Shashirekha KS. (2016) Soxhlet alcoholic extraction of varuna (*Crataeva nurvala*) and its phytochemical analysis. Int Ayur Med J. 4(9): 2728 -2732.

Akula R and Gokare AR.(2011) Influence of abiotic stress signals on secondary metabolites in plants. Plant Signal Behav. 6: 1720-1731.

Aparna V, Dileep KV, Mandal PK, Karthe P, Sadasivan C and Haridas M. (2012) Anti-inflammatory property of n-Hexadecanoic acid: Structural evidence and kinetic assessment. Chem Biol Drug Design 80(3): 434-439.

Bhat SK, Ashwin D, Mythri S and Bhat S. (2017) Arecanut (*Areca catechu* L) decreases Alzheimer's disease symptoms, compilation of research works. J Med Plant Stud. 5(5): 4-9.

Brian CF and Gwyn AB. (2008) An overview of plant defences against pathogens and herbivores. doi:10.1094/PHI-I-2008-0226-01.

Ekor M. (2014) The growing use of herbal medicines, Issues relating to adverse reactions and challenges in monitoring safety. Frontiers Pharm. 177: 1-10.

Gordon MC and David JN. (2013) Natural products, A continuing source of novel drug leads: Biochim Biophys Acta1830: 3670-3695.

Hussain MS, Sheeba F, Saba A, Rahman MA, Iffat ZA and Saeed M. (2012) Current approaches toward production of secondary plant metabolites. J Pharm Bioallied Sci. 4:10-20.

Hutke VD and Rathod V. (2021) Evaluation of antioxidant activity and phytochemical analysis of *Hardwikia binata* (Roxb.). Global J Res Anal.10: 256-259.

Jesen WB. (2007)The origin of the soxhlet extractor. J Chem Edu. 84: 1913-1914.

Krishnamurthy KH. (2009) Supari or betel nut (*Areca catechu* Linn.): Namah J New Approaches Med Hlth. 17:19-26.

Lakhssassi N, Zhou Z, Liu S, Colantonio V, Abu Ghazaleh A and Meksem K. (2017) Characterization of the fad2 gene family in soybean reveals the limitations of gel-based tilling in genes with high copy number. Front Plant Sci. 8: 324.

Moniruzzaman M, Rodriguez I, Ramil M, Cela R, Sulaiman SA and Gan SH. (2014) Assessment of gas chromatography time-of-flight accurate mass spectrometry for identification of volatile and semi-volatile compounds in honey. J Talanta 129: 505-515.

Naveen T and Maneemegalai S. (2010) Evaluation of antibacterial activity of flower extracts of cassia auriculata. Ethno Botanical Leaflet 14: 8-20.

Okene EO and Evobuomwan BO. (2014) Solvent extraction and characterization of oil from coconut seed using alternative solvents. Int J Engg Technol Res. 2: 135-138.

Oxenham MF, Locher C, Cuong NL and Thuy NK. (2002) Identification of *Areca catechu* (betel nut) residues on the dentition of bronze age inhabitants of Nui Np, Northern Vietnam. J Archaeol Sci. 29: 1-7.

Pant DR, Pant ND, Saru DB, Yadav UN and Khanal DP. (2017) Phytochemical screening and study of antioxidant, antimicrobial, antidiabetic, anti-inflammatory and analgesic activities of extracts from stem wood of *Pterocarpus marsupium* Roxburgh. J Intercult Ethnopharmacol. 6(2):170-176.

Rajendra K, Prakash R, Akhilesh K, Dhanesh K, Mahendra K, Pratiksha F and Prachita J. (2021) *A review on phytochemical properties of Calotropis gigantea*. J Plant Pathol. 4:1-2.

Redfern J, Kinninmonth M, Burdass D and Verran J. (2014) Using Soxhlet ethanol extarction to produce and test plant material (essential oils) for their antimicrobial properties. J Micbio Biol Educ.15: 45-46.

Shwetha HR, Kotrashetti VS, Reddy N and Chaitanya BN. (2019) Estimation of the major constituents of arecanut in its different forms. Austin J Nutri Food Sci. 7:1-5.

Siddeeg A, Zakaria A, Salih, Rabab ME and Mukhtar AA. (2018) Extraction and characterization of peppermint (*Mentha piperita*) essential oil and its assessment as antioxidant and antibacterial. Gezira J Engg Appl Sci.13: 1-15.

Staples GW and Bevacqua RF. (2006) *Areca catechu* (betel nut palm). Species Profiles Pacific Island Agroforestry 1: 1-17.

Sundar BB, Shritam D and Tahziba H. (2020) Pharmacognostic properties of *Quisqualis indica* Linn, against human pathogenic microorganisms. European J Med Plants 31: 87-103.

Vadnere GP, Patil AV, Wagh SS and Jain SK. (2011) Evaluation of HRBC membrane stabilization activity of *Cicer arietinum* Linn. Pod wall. Res J Pharm Technol. 9: 1465-1467.

Winstock A. (2002) *Areca catechu* L. nut – abuse liability, dependence and public health. Addiction Biol. 7: 133-138.

Zygler A, Stominska M and Namiesnik J. (2012) Soxhlet Extraction And New Developments Such As Soxtec. J Comprehen Sampling Sample Prep. 2: 65-82.