

## Supplementary Data

### **Phytochemical profiling of *Livistona carinensis* leaves extract via UHPLC-QTOF-MS/MS and NMR with assessment of its antiviral mechanisms**

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**Table S1.** Metabolites detected in the ethanolic extract of *Livistona carinensis* leaves via UPLC-QTOF-MS/MS

Peak No.	Rt (min)	Precursor ion [M-H] <sup>-</sup>	Elemental composition	Base peak	Error (ppm)	MS/MS fragments	Metabolites assignment	Chemical class	Ref.
1	0.4300	173.0086	C <sub>6</sub> H <sub>6</sub> O <sub>6</sub>	173	0.0098	173, 129, 111, 85	Aconitic acid	Organic acid	1
2	0.4657	191.0207	C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	111	0.0203	191, 173, 129, 111, 85	Citric acid	Organic acid	2
3	0.4658	133.0142	C <sub>4</sub> H <sub>6</sub> O <sub>5</sub>	133	0.0145	133, 115, 71	Malic acid	Organic acid	3
4	0.4659	117.0196	C <sub>4</sub> H <sub>6</sub> O <sub>4</sub>	73	0.0182	117, 73	Succinic acid	Organic acid	4
5	0.4800	147.0301	C <sub>5</sub> H <sub>8</sub> O <sub>5</sub>	129	0.0302	147, 129, 85, 59	Citramalic acid	Organic acid	5
6	0.4900	128.0361	C <sub>5</sub> H <sub>7</sub> NO <sub>3</sub>	128	0.0358	128, 127, 82	Oxo-proline	Amino acid derivative	6
7	0.5000	179.0577	C <sub>9</sub> H <sub>8</sub> O <sub>4</sub>	135	0.0563	179, 161, 135, 131, 89, 85, 71, 59	Caffeic acid	Phenolic acid	7
8	0.5172	353.0893	C <sub>16</sub> H <sub>18</sub> O <sub>9</sub>	191	0.0885	353, 191, 179	Chlorogenic acid	Phenolic acid	6
9	0.5172	137.0240	C <sub>6</sub> H <sub>6</sub> N <sub>2</sub> O <sub>2</sub>	93	0.0251	137, 93, 79, 65	Urocanic acid	Organic acid derivative	8
10	0.5301	609.1396	C <sub>27</sub> H <sub>30</sub> O <sub>16</sub>	449	0.0615	609, 447, 285	Luteolin-di-O-hexose	Flavone di-glycoside	9
11	0.5560	134.0473	C <sub>5</sub> H <sub>5</sub> N <sub>5</sub>	134	0.0475	134, 107, 92	Adenine	Nucleoside	6
12	0.6200	175.0598	C <sub>7</sub> H <sub>12</sub> O <sub>5</sub>	175	0.0618	175, 157, 131, 115, 113, 85, 73	Isopropylmalic acid	Organic acid	10

13	0.7330	461.1281	C <sub>21</sub> H <sub>18</sub> O <sub>12</sub>	461	0.1318	461, 419, 285, 193, 151	Kaempferol-hexuronide	Flavonoid glycoside	11
14	0.7340	433.1396	C <sub>25</sub> H <sub>22</sub> O <sub>7</sub>	433	0.1351	433, 395, 300, 179	Haplopappin	Flavonoid	10
15	0.8250	447.1506	C <sub>21</sub> H <sub>20</sub> O <sub>11</sub>	447	0.1524	447, 429, 401, 357, 327, 299, 293	Kaempferol-O-hexoside	Flavonoid glycoside	9
16	0.9100	130.9833	C <sub>5</sub> H <sub>8</sub> O <sub>4</sub>	87	0.9835	131, 87, 57	Methylsuccinic acid	Organic acid derivative	8
17	1.0200	137.0257	C <sub>7</sub> H <sub>6</sub> O <sub>3</sub>	137	0.0249	137, 136, 108, 93	Salicylic acid	Phenolic acid derivative	1
18	1.4060	177.0211	C <sub>9</sub> H <sub>6</sub> O <sub>4</sub>	177	0.0201	177, 149, 133	Dihydroxy-coumarin (Aesculetin)	Hydroxy-coumarin	6
19	1.4061	343.1026	C <sub>12</sub> H <sub>24</sub> O <sub>11</sub>	343	0.1050	343, 299, 137, 89	Maltitol	Disaccharide	11
20	2.0210	385.1860	C <sub>17</sub> H <sub>22</sub> O <sub>10</sub>	385	0.1884	385, 325, 223, 152, 89	Sinapoyl hexoside	Hydroxy-cinnamic acid glycoside	10
21	2.0380	431.1924	C <sub>21</sub> H <sub>20</sub> O <sub>10</sub>	431	0.1927	431, 341, 311, 283, 269	Apigenin-C-hexoside (Vitexin)	Flavone glycoside	9
22	2.0382	447.0934	C <sub>21</sub> H <sub>20</sub> O <sub>11</sub>	447	0.0956	447, 401, 357, 327, 297, 285	Luteolin-C-hexoside (Isoorientin)	Flavonoid glycosides	12
23	2.4990	60.9929	CH <sub>2</sub> O <sub>3</sub>	60.99	0.0229	60.99	Carbonic acid	Organic acid	1
24	2.5960	593.1507	C <sub>27</sub> H <sub>30</sub> O <sub>15</sub>	593	0.1507	593, 473, 413, 315	Isorhamnetin-O-pentoside deoxyhexose	Flavonoid glycoside	9

25	2.7980	593.1524	C <sub>27</sub> H <sub>30</sub> O <sub>15</sub>	593	0.1515	593, 431, 413, 293	Kaempferol- <i>O</i> -hexose-deoxyhexoside	Flavonoid glycosides	9
26	2.8440	167.0343	C <sub>8</sub> H <sub>8</sub> O <sub>4</sub>	167	0.0346	167, 152, 124, 108	Homogentisic acid	Phenolic acid	6
27	3.1390	431.0990	C <sub>21</sub> H <sub>20</sub> O <sub>10</sub>	431	0.0998	431, 341, 311, 283	Apigenin- <i>C</i> -hexoside (Vitexin)	Flavone glycoside	12
28	3.2900	523.2192	C <sub>26</sub> H <sub>36</sub> O <sub>11</sub>	361	0.1232	523, 492, 477, 361	Secoisolariciresinol mono-hexoside	Lignan	10
29	3.4400	138.0193	C <sub>6</sub> H <sub>5</sub> NO <sub>3</sub>	138	0.0199	138, 108, 92	Para-nitrophenol	Phenolics	6
30	4.0900	623.1631	C <sub>28</sub> H <sub>32</sub> O <sub>16</sub>	623	0.1641	623, 577, 315	Isorhamnetin- <i>O</i> -hexose-deoxyhexoside (Narcissin)	Flavonol glycoside	11
31	4.2100	447.0939	C <sub>21</sub> H <sub>20</sub> O <sub>11</sub>	447	0.0941	447, 357, 327, 297, 285, 137	Luteolin- <i>C</i> -hexose (Orientin)	Flavone glycoside	10
32	4.2900	507.1152	C <sub>23</sub> H <sub>24</sub> O <sub>13</sub>	507	0.1139	507, 461, 345	Syringetin- <i>O</i> -hexoside	Flavonol glycoside	10
33	4.3100	449.1508	C <sub>21</sub> H <sub>22</sub> O <sub>11</sub>	449	0.1491	449, 287	Okanin- <i>O</i> -hexoside (Marein)	Chalcone/ Aurone	10
34	4.5091	341.0676	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub>	341	0.0677	341, 179, 161	Dihexose	Disaccharide	8
35	4.5490	637.1762	C <sub>29</sub> H <sub>34</sub> O <sub>16</sub>	329	0.0659	637, 329, 314	Tricin- <i>O</i> -hexose-deoxyhexoside	Flavone glycoside	9
36	4.5810	317.1498	C <sub>16</sub> H <sub>31</sub> BrO	225	0.1142	317, 299, 225, 207, 181	Bromopalmitaldehyde	Fatty acid derivative	10
37	4.7060	193.0517	C <sub>6</sub> H <sub>10</sub> O <sub>7</sub>	193	0.0508	193, 178, 161, 133	Uronic acid	Sugar acid	13

38	4.7070	477.1378	C <sub>22</sub> H <sub>22</sub> O <sub>12</sub>	477	0.1439	477, 315, 271	Isorhamnetin- <i>O</i> -hexoside	Flavonol glycoside	14
39	4.8130	377.1758	C <sub>24</sub> H <sub>26</sub> O <sub>4</sub>	241	0.0174	377, 345, 241, 152, 137	Albafuran A	Benzofuran	6
40	4.8347	507.1468	C <sub>23</sub> H <sub>24</sub> O <sub>13</sub>	507	0.1493	507, 345	Syringetin- <i>O</i> -hexoside	Flavonol glycoside	10
41	4.8471	405.1709	C <sub>20</sub> H <sub>22</sub> O <sub>9</sub>	405	0.1683	405, 243	Trihydroxy-3'-hexopyranosylstilbene (Astringin)	Stilbene glycoside	6
42	5.0495	445.1853	C <sub>21</sub> H <sub>18</sub> O <sub>11</sub>	269	0.1860	445, 409, 269, 161	Baicalein- <i>O</i> -hexouronide (Baicalin)	Flavone glycoside	11
43	5.1845	287.0564	C <sub>15</sub> H <sub>12</sub> O <sub>6</sub>	287	0.0565	287, 151, 135, 134	Tetrahydroxy flavanone (Eriodictyol)	Flavanone	15
44	5.5620	869.2329	C <sub>54</sub> H <sub>77</sub> O <sub>9</sub>	869	0.1786	869, 833, 637, 329	Tricin derivative	-----	-----
45	5.5645	611.1412	C <sub>28</sub> H <sub>36</sub> O <sub>15</sub>	611	0.1452	611, 565, 413, 311	Neohesperidin dihydrochalcone	Chalcone/ Aurone	6
46	5.6345	285.0411	C <sub>15</sub> H <sub>10</sub> O <sub>6</sub>	285	0.0409	285, 241, 175, 151, 133	Tetrahydroxyflavone (Luteolin)	Flavones	9
47	5.6855	301.0340	C <sub>15</sub> H <sub>10</sub> O <sub>7</sub>	301	0.0361	301, 273, 255, 193, 179, 151, 121	Pentahydroxyflavone (Quercetin)	Flavonol	12
48	5.8207	449.1473	C <sub>21</sub> H <sub>22</sub> O <sub>11</sub>	287	0.1451	449, 413, 341, 287	Marein (Okanin- <i>O</i> -hexose)	Chalcone/ Aurone	10
49	5.9246	195.1016	C <sub>6</sub> H <sub>12</sub> O <sub>7</sub>	195	0.1025	195, 151, 123, 94	Pentahydroxyhexanoic acid (Gluconic acid)	Sugar acid	8

50	6.3963	433.1507	C <sub>21</sub> H <sub>22</sub> O <sub>10</sub>	217	0.1523	433, 271, 256, 241	Naringenin- <i>O</i> -hexoside (Prunin)	Flavanone glycoside	10
51	6.5200	269.0465	C <sub>15</sub> H <sub>10</sub> O <sub>5</sub>	269	0.0467	269, 151, 117	Trihydroxyflavone (Apigenin)	Flavone	16
52	6.7570	329.0676	C <sub>17</sub> H <sub>14</sub> O <sub>7</sub>	329	0.0659	329, 314, 299, 271	Tricin	Flavone	6
53	6.7828	345.059	C <sub>19</sub> H <sub>22</sub> O <sub>6</sub>	345	0.0632	345, 330, 315, 307, 285, 137	Gibberellic acid	Diterpene lactones	17
54	6.7951	299.0553	C <sub>16</sub> H <sub>12</sub> O <sub>6</sub>	299	0.0567	299, 285, 284, 151	Trihydroxymethoxyflavone (Kaempferide)	Flavonol	16
55	6.8601	381.1511	C <sub>19</sub> H <sub>26</sub> O <sub>8</sub>	381	0.1552	381, 251, 87	Myristoyl-hydroxy-sn-glycerol	Fatty acid derivative	18
56	7.0754	315.0526	C <sub>16</sub> H <sub>12</sub> O <sub>7</sub>	315	0.0514	315, 300, 269, 79	Tetrahydroxymethoxyflavone (Isorhamnetin)	Flavonol	16
57	7.0883	415.1511	C <sub>21</sub> H <sub>20</sub> O <sub>9</sub>	415	0.1512	415, 295	Daidzein- <i>C</i> -hexoside (Puerarin)	Isoflavone <i>C</i> -glycoside	9
58	7.0980	575.4317	C <sub>35</sub> H <sub>60</sub> O <sub>6</sub>	575	0.1407	575, 413, 363	$\beta$ -Sitosterol-3- <i>O</i> -hexoside	Steroid	19
59	7.3950	588.1413	C <sub>16</sub> H <sub>25</sub> N <sub>5</sub> O <sub>15</sub>	588	0.1380	588, 525, 329, 314	Tricin derivative	Flavonoid glycoside	9
60	8.8660	711.1517	C <sub>31</sub> H <sub>36</sub> O <sub>19</sub>	675	0.1720	711, 675, 329, 137	Tricin derivative	Flavonoid glycoside	9
61	10.059	645.2010	C <sub>32</sub> H <sub>38</sub> O <sub>14</sub>	645	0.1969	645, 525, 315, 270, 137	Isorhamnetin derivative	Flavonoid glycoside	6
62	10.5290	459.3143	C <sub>31</sub> H <sub>56</sub> O <sub>2</sub>	459	0.3111	459, 415	Pentacosyl-1,3-benzenediol	Fatty acid derivative	20

63	12.2630	867.4821	C <sub>45</sub> H <sub>72</sub> O <sub>16</sub>	867	0.2291	867, 413, 329	Dioscin	Steroidal saponin	19
64	13.2610	639.2294	C <sub>25</sub> H <sub>49</sub> O <sub>11</sub> P	555	0.2823	639, 555, 225	Hexadecenyl-glycero-3-phospho-(1'-myo-inositol)	Fatty acid derivative	6
65	14.0260	453.3028	C <sub>29</sub> H <sub>42</sub> O <sub>4</sub>	453	0.2980	453, 409, 407, 339	Epoxy-tetrahydro-dihomo-dihydroxycholecalciferol	Vitamin D derivative	10
66	15.2280	425.3282	C <sub>29</sub> H <sub>46</sub> O <sub>2</sub>	425	0.2506	425, 381, 139	hydroxy-24-methylergocalciferol	Vitamin D derivative	10
67	15.2970	89.0261	C <sub>3</sub> H <sub>6</sub> O <sub>3</sub>	89	0.0261	89, 71	Dihydroxyacetone	Organic acid	1
68	15.5850	369.1107	C <sub>17</sub> H <sub>22</sub> O <sub>9</sub>	277	0.2192	368, 306, 277	Sinapaldehyde hexoside	Phenolic glycoside	9
69	16.8910	559.4199	C <sub>36</sub> H <sub>64</sub> O <sub>4</sub>	279	0.2333	559, 279	Linoleic acid dimer	Fatty acid derivative	20
70	18.1210	585.5093	C <sub>36</sub> H <sub>58</sub> O <sub>6</sub>	255	0.2337	585, 255	Deoxyphorbol-palmitate	Fatty acid derivative	20
71	18.7010	685.5196	C <sub>31</sub> H <sub>42</sub> O <sub>17</sub>	685	0.2455	685, 649, 365, 281	Unknown	---	---
72	18.7910	401.2425	C <sub>24</sub> H <sub>34</sub> O <sub>5</sub>	281	0.2461	401, 325, 281, 137	Trioxo-cholanoic acid	Steroids	19
73	20.1650	701.4745	C <sub>31</sub> H <sub>42</sub> O <sub>18</sub>	701	0.4745	701, 569, 419, 302, 119	Unknown	---	---
74	20.2360	199.1741	C <sub>12</sub> H <sub>24</sub> O <sub>2</sub>	129	0.1741	199, 147, 127, 69, 59	Methyl-undecanoic acid	Fatty acid derivative	20
75	20.8260	359.1939	C <sub>21</sub> H <sub>28</sub> O <sub>5</sub>	359	0.1939	359, 285, 283, 135	Dihydroprednisone	Steroids	19



76	22.9190	461.3570	C <sub>25</sub> H <sub>50</sub> O <sub>7</sub>	461	0.3446	461, 193, 151, 138	Hexopyranosyl-1,2-nonadecandiol	Fatty acyl glycoside	20
77	23.5530	461.3664	C <sub>31</sub> H <sub>58</sub> O <sub>2</sub>	461	0.3641	461, 419, 311, 293, 195, 151	Hentriacontene-2,4-dione	Fatty acid derivative	20
78	24.4630	447.0945	C <sub>21</sub> H <sub>20</sub> O <sub>11</sub>	447	0.3753	447, 357, 327, 285, 177	Luteolin-C-hexoside	Flavonoid glycoside	9
79	25.0640	667.5442	C <sub>43</sub> H <sub>72</sub> O <sub>5</sub>	665	0.5374	665, 377, 283, 136, 62	Unknown	---	---
80	25.6510	665.5089	C <sub>43</sub> H <sub>70</sub> O <sub>5</sub>	62	0.5089	665, 377, 283, 245, 212, 138, 136, 62	Unknown	---	---

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