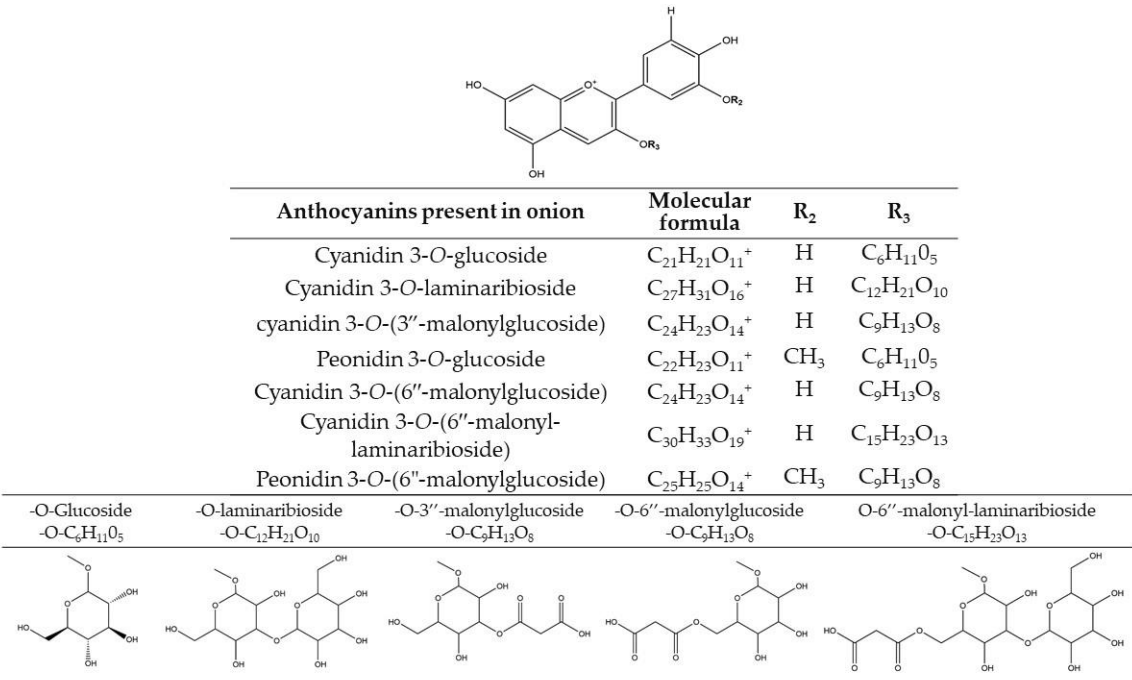


# Development of an Optimized Ultrasound-Assisted Extraction Methods for the Recovery of Total Phenolic Compounds and Anthocyanins from Onion Bulbs

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## SUPPLEMENTARY MATERIAL



**Figure S1.** Information about anthocyanins identified in red onion.

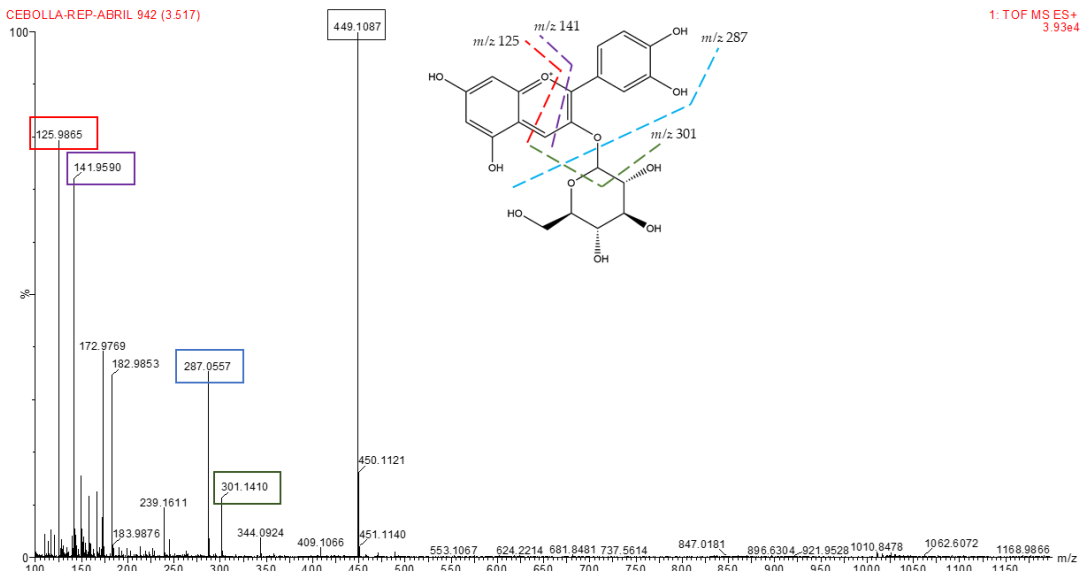
**Table S1.** Mass spectra information of the nine anthocyanins present in onion bulb.

Compounds	Predicted formula	Retention time (min)	<i>m/z</i> *	Ion Assignment
Cyanidin 3- <i>O</i> -glucoside	C <sub>21</sub> H <sub>21</sub> O <sub>11</sub> <sup>+</sup>	3.517	449.1087	[M+H] <sup>+</sup>
			301.1410	[M+H-C <sub>5</sub> H <sub>10</sub> O <sub>5</sub> ] <sup>+</sup>
			287.0557	[M+H-C <sub>6</sub> H <sub>8</sub> O <sub>5</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>14</sub> H <sub>12</sub> O <sub>8</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>15</sub> H <sub>16</sub> O <sub>8</sub> ] <sup>+</sup>
Cyanidin 3- <i>O</i> -laminaribioside	C <sub>27</sub> H <sub>31</sub> O <sub>16</sub> <sup>+</sup>	4.132	611.1641	[M+H] <sup>+</sup>
			301.1410	[M+H-C <sub>11</sub> H <sub>18</sub> O <sub>10</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>20</sub> H <sub>22</sub> O <sub>13</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>21</sub> H <sub>26</sub> O <sub>13</sub> ] <sup>+</sup>
cyanidin 3- <i>O</i> -(3''-malonylglucoside)	C <sub>24</sub> H <sub>23</sub> O <sub>14</sub> <sup>+</sup>	4.875	535.1069	[M+H] <sup>+</sup>
			301.1410	[M+H-C <sub>8</sub> H <sub>10</sub> O <sub>8</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>17</sub> H <sub>14</sub> O <sub>11</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>18</sub> H <sub>18</sub> O <sub>11</sub> ] <sup>+</sup>
Peonidin 3- <i>O</i> -glucoside	C <sub>22</sub> H <sub>23</sub> O <sub>11</sub> <sup>+</sup>	5.348	463.1251	[M+H] <sup>+</sup>
			301.1424	[M+H-C <sub>6</sub> H <sub>10</sub> O <sub>5</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>15</sub> H <sub>14</sub> O <sub>8</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>16</sub> H <sub>18</sub> O <sub>8</sub> ] <sup>+</sup>
Delphinidin 3,5- <i>O</i> -diglucoside	C <sub>27</sub> H <sub>31</sub> O <sub>17</sub> <sup>+</sup>	5.721	649.1392	[M+H+Na] <sup>+</sup>
			627.1572	[M+H] <sup>+</sup>
			465.1046	[M+H-C <sub>6</sub> H <sub>10</sub> O <sub>5</sub> ] <sup>+</sup>
			303.0511	[M+H-C <sub>12</sub> H <sub>20</sub> O <sub>10</sub> ] <sup>+</sup>
Cyanidin 3- <i>O</i> -(6''-malonylglucoside)	C <sub>24</sub> H <sub>23</sub> O <sub>14</sub> <sup>+</sup>	5.850	535.1104	[M+H] <sup>+</sup>
			287.0561	[M+H-C <sub>9</sub> H <sub>12</sub> O <sub>8</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>17</sub> H <sub>14</sub> O <sub>11</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>18</sub> H <sub>18</sub> O <sub>11</sub> ] <sup>+</sup>
Cyanidin- 3- <i>O</i> -(6''-malonyl-laminaribioside)	C <sub>30</sub> H <sub>33</sub> O <sub>19</sub> <sup>+</sup>	6.052	697.1613	[M+H] <sup>+</sup>
			287.0561	[M+H-C <sub>15</sub> H <sub>22</sub> O <sub>13</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>23</sub> H <sub>24</sub> O <sub>16</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>24</sub> H <sub>28</sub> O <sub>16</sub> ] <sup>+</sup>
Peonidin 3- <i>O</i> -malonylglucoside	C <sub>25</sub> H <sub>25</sub> O <sub>14</sub> <sup>+</sup>	6.323	549.1255	[M+H] <sup>+</sup>
			301.1418	[M+H-C <sub>9</sub> H <sub>12</sub> O <sub>8</sub> ] <sup>+</sup>
			141.9590	[M+H-C <sub>18</sub> H <sub>16</sub> O <sub>11</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>19</sub> H <sub>20</sub> O <sub>11</sub> ] <sup>+</sup>
Delphinidin 3- <i>O</i> -glucoside	C <sub>21</sub> H <sub>21</sub> O <sub>12</sub> <sup>+</sup>	6.536	487.0863	[M+H+Na] <sup>+</sup>
			465.1055	[M+H] <sup>+</sup>
			303.0508	[M+H-C <sub>6</sub> H <sub>10</sub> O <sub>5</sub> ] <sup>+</sup>
			141.9587	[M+H-C <sub>14</sub> H <sub>12</sub> O <sub>9</sub> ] <sup>+</sup>
			125.9865	[M+H-C <sub>15</sub> H <sub>16</sub> O <sub>9</sub> ] <sup>+</sup>

\* The fragments identified have been selected based on their greater abundance or greater selectivity (larger *m/z*).

(a)

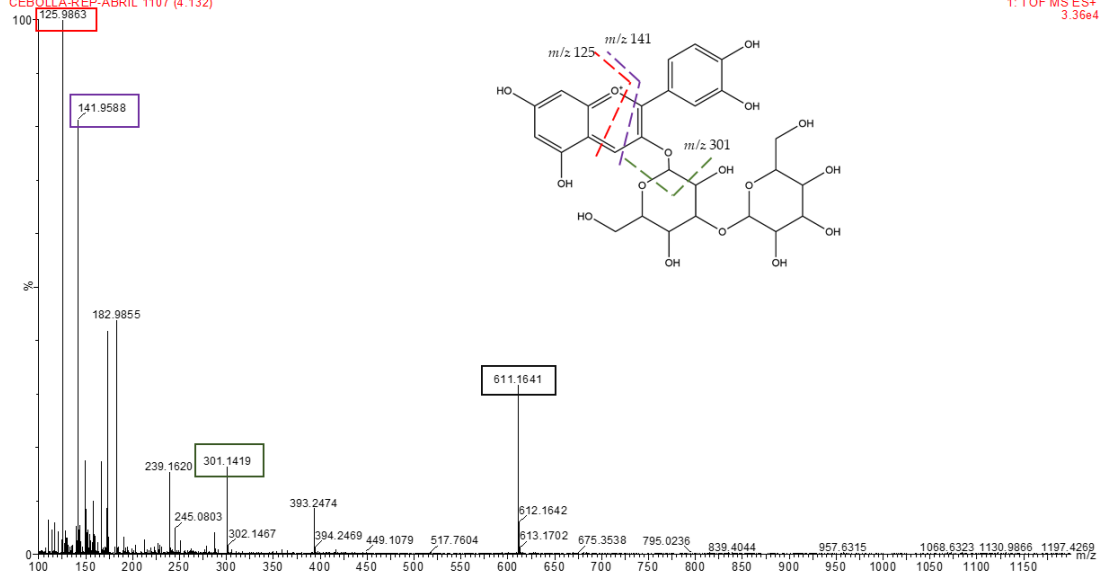
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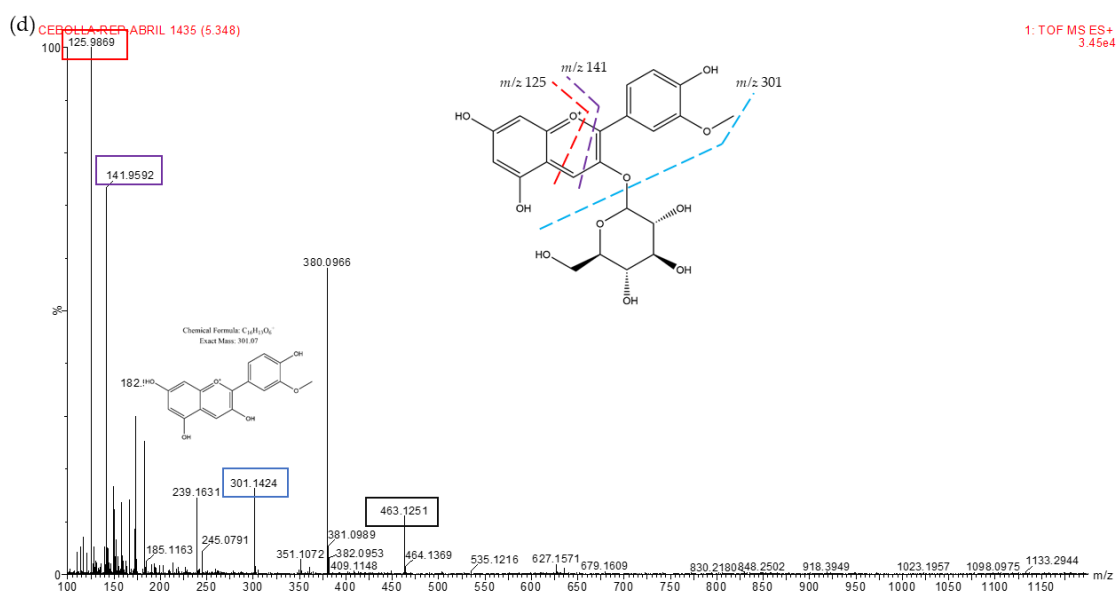
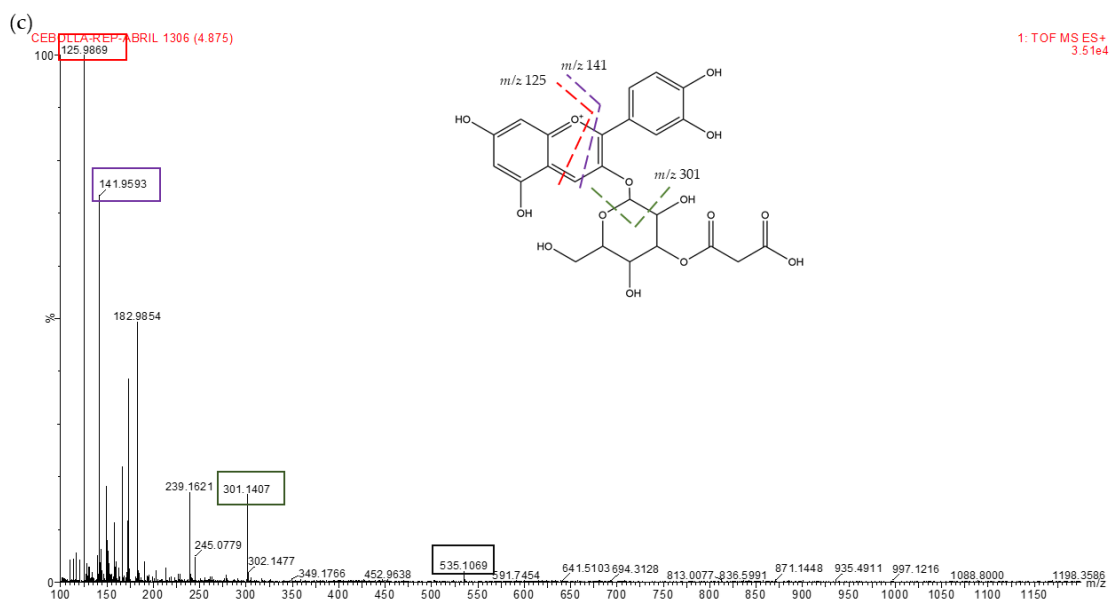
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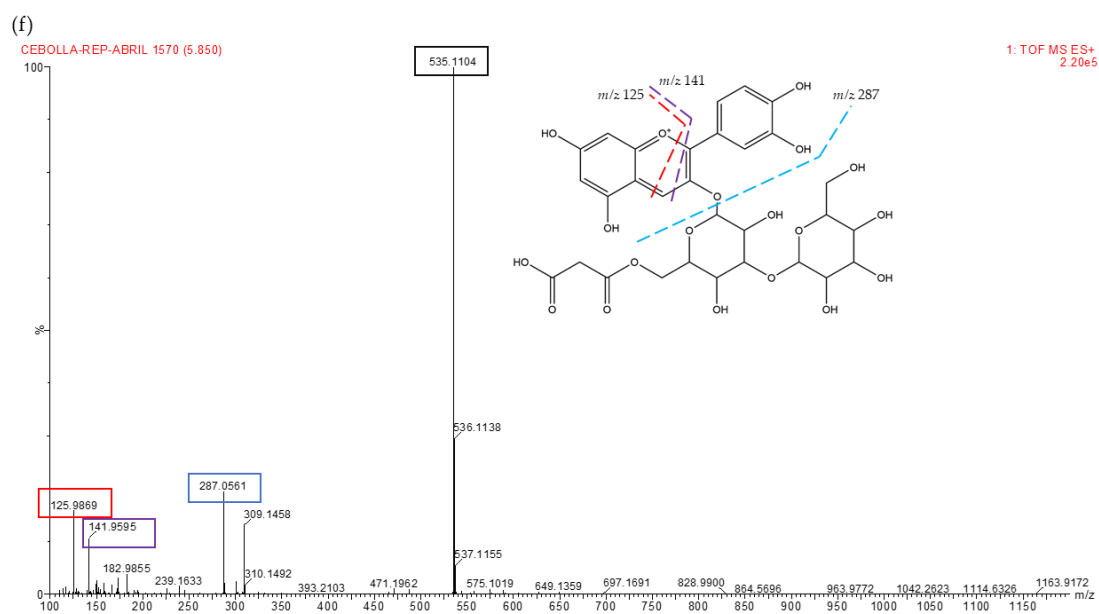
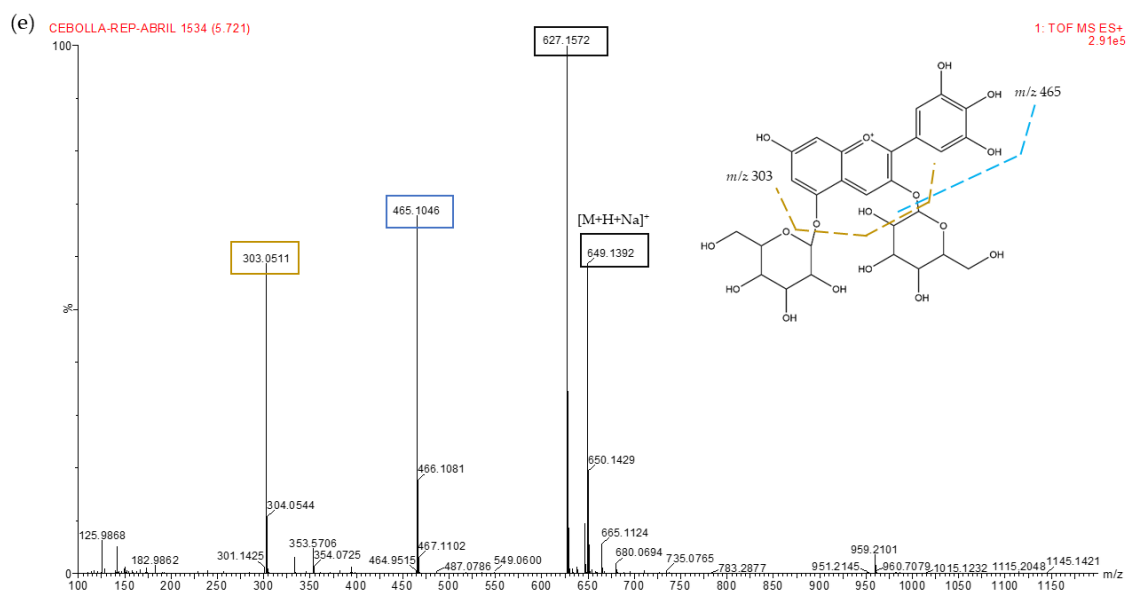
(b)

CEBOLLA-REP-ABRIL 1107 (4.132)



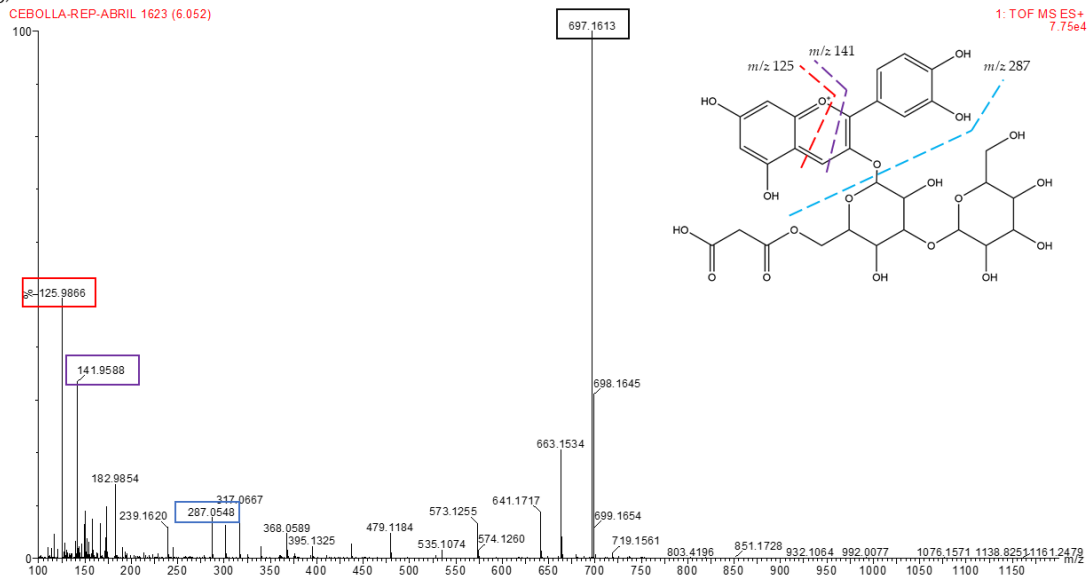
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3.36e4





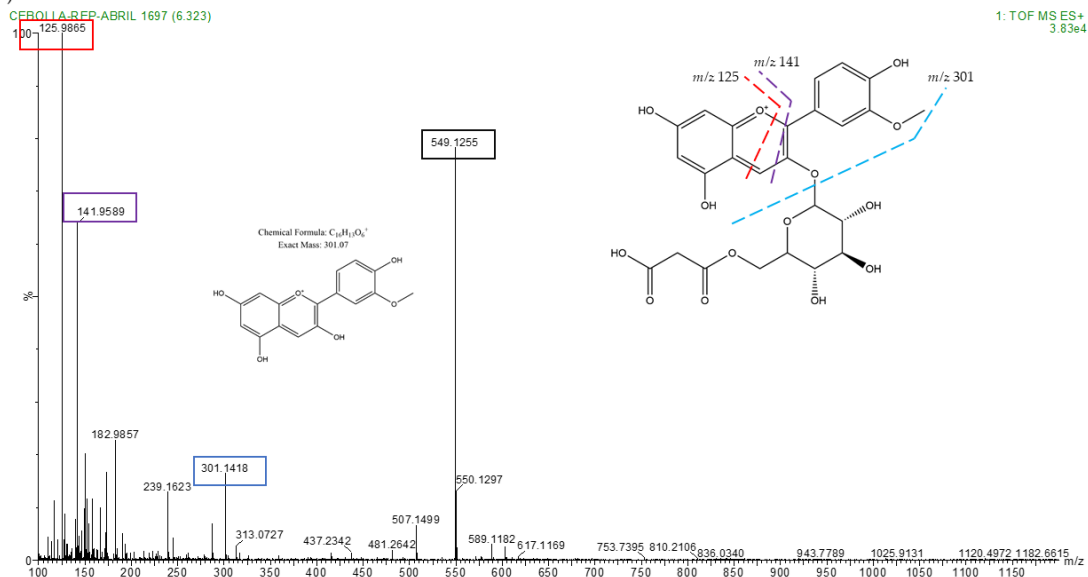
(g)

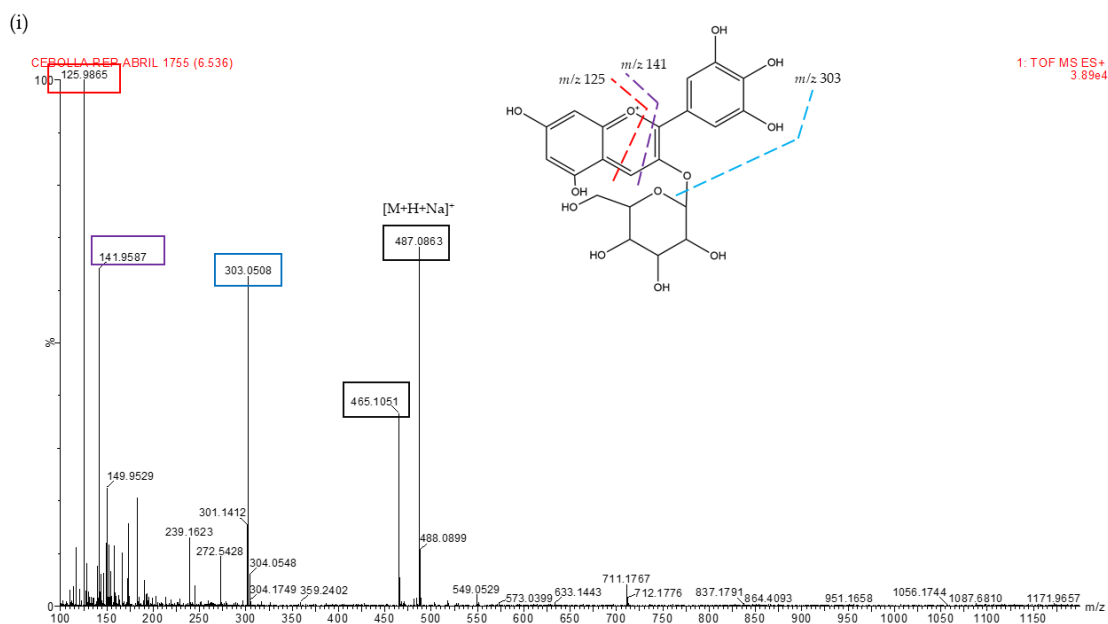
CEBOLLA-REP-ABRIL 1623 (6.052)



(h)

CEBOLLA-REP-ABRIL 1697 (6.323)





**Figure S2.** MS spectra and structure of the nine anthocyanins identified in onion bulb: (a) cyanidin 3-*O*-glucoside; (b) cyanidin 3-*O*-laminaribioside; (c) cyanidin 3-*O*-(3''-malonylglucoside); (d) peonidin 3-*O*-glucoside; (e) delphinidin 3,5-*O*-diglucoside; (f) cyanidin 3-*O*-(6''-malonylglucoside); (g) cyanidin 3-*O*-(6''-malonyl-laminaribioside); (h) peonidin 3-*O*-malonylglucoside; (i) delphinidin 3-*O*-glucoside. The molecular ion has been framed in black and the fragments in different colors.