Supplementary Materials

Oxalis corniculata L. as a Source of Natural Antioxidants: Phytochemistry, Bioactivities, and Application Potential

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Table S1. Chemical compounds isolated from *O. corniculata.*

NO.	Compounds	Molecular Formula	Parts	Refs.
Flavonoids				
1	Luteolin	$C_{15}H_{10}O_6$	Whole herb	[1-4]
2	Luteolin-O-rutinoside	$C_{27}H_{30}O_{15}$	Whole herb	[2]
3	Luteolin-3',7-di-O-glucoside	$C_{27}H_{30}O_{16}$	Whole herb	[2]
4	Luteolin-7-O-β-D-glucoside	$C_{21}H_{20}O_{11}$	Whole herb	[3]
5	Lonicerin	$C_{27}H_{30}O_{15}$	Whole herb	[1, 2]
6	Diosmetin	$C_{16}H_{12}O_6$	Whole herb	[1, 2, 5]
7	Diosmetin 7-O-beta-D-glucopyranoside	$C_{22}H_{22}O_{11}$	Leave	[6]
8	Diosmin	$C_{28}H_{32}O_{15}$	Whole herb	[4, 7]
9	Luteolin-6-C-glucose-2″-O-rhamnoside	$C_{27}H_{30}O_{15}$	Whole herb	[2]
10	Apigenin	$C_{15}H_{10}O_5$	Whole herb	[1, 2, 4, 8, 9]
11	Apigenin-6,8-di-C-β-D-glucoside	$C_{27}H_{30}O_{15}$	Whole herb	[2]
12	Apigenin 7,4′-diglucoside	$C_{27}H_{30}O_{15}$	Leave	[6]
13	Isoschaftoside	$C_{26}H_{28}O_{14}$	Whole herb	[1, 2, 10]
14	Neoschaftoside	$C_{26}H_{28}O_{14}$	Whole herb	[10]
15	Cosmosiin	$C_{21}H_{20}O_{10}$	Whole herb	[2]
16	Vitexin	$C_{21}H_{20}O_{10}$	Whole herb	[2, 6]
17	Vitexin -4''-O-glucoside	$C_{27}H_{30}O_{15}$	Whole herb	[1]
18	Vitexin 2''-O-rhamnoside	$C_{27}H_{30}O_{14}$	Whole herb	[1]
19	Vitexin 6''-O-malonyl 2''-O-xyloside	$C_{29}H_{30}O_{17}$	Leave	[11]
20	Isovitexin	$C_{21}H_{20}O_{10}$	Whole herb, Leave	[1, 2, 5, 6, 10, 12]
21	Isovitexin-7-O-glucoside	$C_{27}H_{30}O_{15}$	Whole herb	[2]
22	Isovitexin-2''-O-rhamnoside	$C_{27}H_{30}O_{14}$	Whole herb	[2]
23	Swertisin	$C_{22}H_{22}O_{10}$	Whole herb, Leave	[1, 2, 5, 6]
24	Swertiajaponin	$C_{22}H_{22}O_{11}$	Whole herb	[1]
25	Isoorientin	$C_{21}H_{20}O_{11}$	Whole herb	[1, 2, 10]
26	Spinosin	$C_{28}H_{32}O_{15}$	Whole herb	[1]
27	Jaceosidin	$C_{17}H_{14}O_7$	Whole herb	[1]
28	Hispidulin	$C_{16}H_{12}O_6$	Whole herb	[1]
29	5-Demethylnobiletin	$C_{20}H_{20}O_8$	Whole herb	[13]
30	Sinensetin	$C_{20}H_{20}O_7$	Whole herb	[1]
31	Isosinensetin	$C_{20}H_{20}O_7$	Whole herb	[1]
32	Orientin	$C_{21}H_{20}O_{11}$	Whole herb	[1, 2, 14]
33	Chryseriol	$C_{16}H_{12}O_6$	Whole herb	[1, 4]
34	Scoparin	$C_{22}H_{22}O_{11}$	Whole herb	[1]
35	Chrysin	$C_{15}H_{10}O_4$	Whole herb	[4]
36	Tectochrysin	$C_{16}H_{12}O_4$	Whole herb	[4]
37	Acacetin	$C_{16}H_{12}O_5$	Whole herb	[4, 9]
38	Moslosooflavone	$C_{17}H_{14}O_5$	Whole herb	[13]

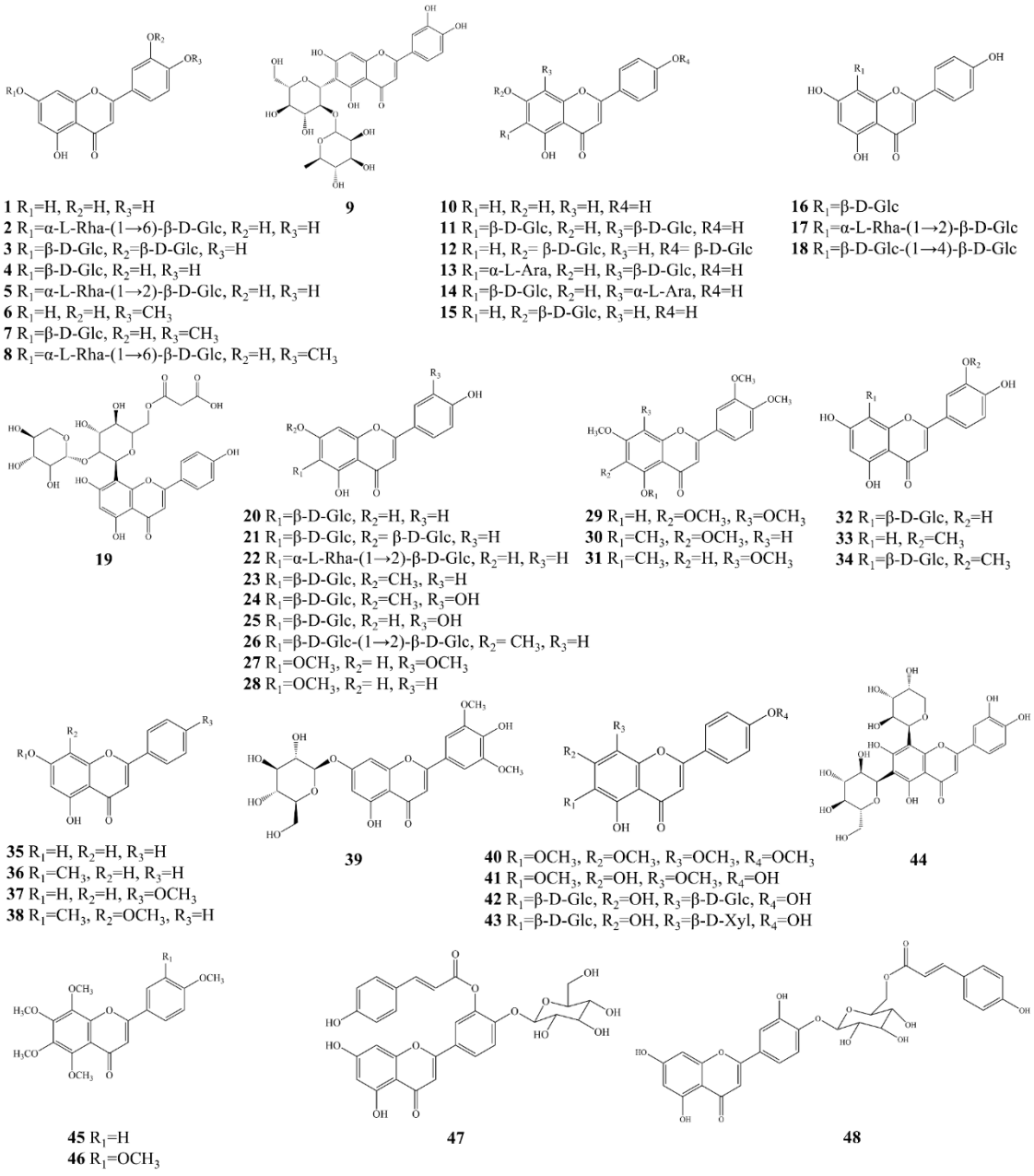
39	Tricin-7-O-β-D-glucopyranoside	$C_{23}H_{24}O_{13}$	Whole herb	[1]
40	5-hydroxy-6,7,8,4′-tetramethoxyflavone	$C_{19}H_{18}O_7$	Whole herb	[9, 15]
41	5,7,4′-trihydroxy-6,8-dimethoxyflavone	$C_{17}H_{14}O_7$	Whole herb	[15]
42	Vicenin 2	$C_{27}H_{30}O_{15}$	Whole herb	[1]
43	Vicenin 3	$C_{26}H_{28}O_{14}$	Whole herb	[1]
44	Carlinoside	$C_{26}H_{28}O_{15}$	Whole herb	[1]
45	Tangeretin	$C_{20}H_{20}O_7$	Whole herb	[1]
46	Nobiletin	$C_{21}H_{22}O_8$	Whole herb	[1]
47	N/A	$C_{30}H_{28}O_{13}$	Whole herb	[13]
48	Corniculatin A	$C_{30}H_{28}O_{13}$	Whole herb	[3, 16]
49	Penduletin	$C_{18}H_{16}O_7$	Whole herb	[13]
50	5-Hydroxy-3,6,7,4'-tetramethoxyflavone	$C_{19}H_{18}O_7$	Whole herb	[13]
51	2-(3,4-Dimethoxyphenyl)-3,6,7-trimethoxychromen-4-one	$C_{20}H_{20}O_7$	Whole herb	[13]
52	3,5,2'-Trihydroxy-7,5'-dimethoxyflavone	$C_{17}H_{14}O_7$	Whole herb	[13]
53	Rhamnazin	$C_{17}H_{14}O_7$	Whole herb	[1]
54	Isorhamnetin 3-glucoside-7-rhamnoside	$C_{28}H_{32}O_{16}$	Whole herb	[1]
55	Quercetin	$C_{15}H_{10}O_7$	Whole herb	[1, 2, 4, 17, 18]
56	Quercetin 3-rutinoside-7-glucoside	$C_{33}H_{40}O_{21}$	Whole herb	[1]
57	Quercetin 3-O-glucuronide	$C_{21}H_{18}O_{13}$	Whole herb	[1]
58	Rutin	$C_{27}H_{30}O_{16}$	Leave	[19]
59	Kaempferol	$C_{15}H_{10}O_6$	Whole herb	[1, 17]
60	Kaempferol 3-glucoside 7-rhamnoside	$C_{27}H_{30}O_{15}$	Whole herb	[10]
61	Kaempferol 3-O-sophorotrioside	$C_{33}H_{40}O_{21}$	Leave	[11]
62	Kaempferol 3-O-glucuronide	$C_{21}H_{18}O_{12}$	Leave	[11]
63	kaempferol-3-O-alpha-L-rhamnoside	$C_{21}H_{20}O_{10}$	Whole herb	[14]
64	Kaempferitrin	$C_{27}H_{30}O_{14}$	Aerial part	[20]
65	Panasenoside	$C_{27}H_{30}O_{16}$	Whole herb	[10]
66	Betuletol	$C_{17}H_{14}O_7$	Whole herb	[13]
67	Eupalitin	$C_{17}H_{14}O_7$	Whole herb	[13]
68	Naringenin-7-O-beta-D-glucuronide	$C_{21}H_{20}O_{11}$	Whole herb	[10]
69	Hesperitin	$C_{16}H_{14}O_6$	Whole herb	[4]
70	Rhusflavone	$C_{30}H_{22}O_{10}$	Whole herb	[4]
71	4''-Methyloxy-genistin	$C_{22}H_{22}O_{10}$	Whole herb	[10]
72	Tectoridin	$C_{22}H_{22}O_{11}$	Whole herb	[2]
73	Tectorigenin	$C_{16}H_{12}O_6$	Aerial part	[20]

74	Iristectorigenin B	$C_{17}H_{14}O_7$	Whole herb	[2]
75	iristectorigenin A	$C_{17}H_{14}O_7$	Aerial part	[20]
76	Irigenin	$C_{18}H_{16}O_8$	Aerial part	[20]
77	Daidzin	$C_{21}H_{20}O_9$	Whole herb	[1]
78	Formononetin	$C_{16}H_{12}O_4$	Whole herb	[1]
79	3'-Hydroxy puerarin	$C_{21}H_{20}O_{10}$	Whole herb	[10]
80	Isoliquiritin	$C_{21}H_{22}O_9$	Whole herb	[4]
81	Phlorizin	$C_{21}H_{24}O_{10}$	Whole herb	[4]
82	Naringin Dihydrochalcone	$C_{27}H_{34}O_{14}$	Whole herb	[4]
83	Epicatechin	$C_{15}H_{14}O_6$	Whole herb	[1, 10]
84	Epigallocatechin	$C_{15}H_{14}O_7$	Whole herb	[1]
Organic acids				
85	Protocatechuic acid	$C_7H_6O_4$	Whole herb	[1, 2, 4]
86	Vanillic acid	$C_8H_8O_4$	Leave	[6, 21]
87	Chlorogenic acid	$C_{16}H_{18}O_9$	Whole herb	[2, 4]
88	Cryptochlorogenic acid	$C_{16}H_{18}O_9$	Whole herb	[1]
89	Caffeic acid	$C_9H_8O_4$	Leave	[11]
90	1-Caffeoylquinic acid	$C_{16}H_{18}O_9$	Whole herb	[2]
91	3-O-Caffeoylquinic acid	$C_{16}H_{18}O_9$	Whole herb, Leave	[11, 22]
92	Isochlorogenic acid A	$C_{25}H_{24}O_{12}$	Whole herb	[1]
93	Isochlorogenic acid B	$C_{25}H_{24}O_{12}$	Whole herb	[1]
94	Rosmarinic acid	$C_{18}H_{16}O_8$	Whole herb	[4]
95	Ferulic acid	$C_{10}H_{10}O_4$	Whole herb, Leave	[1, 2, 17, 18]
96	3-O-Feruloylquinic acid	$C_{17}H_{20}O_9$	Whole herb	[1, 2]
97	4-O-Feruloylquinic acid	$C_{17}H_{20}O_9$	Whole herb	[1]
98	Gallic acid	$C_7H_6O_5$	Whole herb	[1, 19, 21]
99	p-Hydroxybenzoic acid	$C_7H_6O_3$	Whole herb, Leave	[4, 6, 9, 11, 17, 18]
100	Eschweilenol C	$C_{20}H_{16}O_{12}$	Leave	[11]
101	Coumaroyl quinic acid	$C_{16}H_{18}O_8$	Whole herb	[4]
102	Gentisic Acid	$C_7H_6O_4$	Whole herb	[1]
103	p-Coumaric acid	$C_9H_8O_3$	Leave	[11]
104	4-O-p-Coumaroylquinic acid	$C_{16}H_{18}O_8$	Whole herb	[1]
105	5-O-p-Coumaroylquinic acid	$C_{16}H_{18}O_8$	Whole herb	[1]
106	Sinapic acid	$C_{11}H_{12}O_5$	Leave	[11]
107	Glucosyringic acid	$C_{15}H_{20}O_{10}$	Whole herb	[1]
108	Cinnamic acid	$C_9H_8O_2$	Whole herb	[4]
109	Aconitic acid	$C_6H_6O_6$	Whole herb	[1]
110	Quinate	$C_7H_{12}O_6$	Whole herb	[1]
111	Azelaic acid	$C_9H_{16}O_4$	Whole herb	[1, 2]
112	Malic acid	$C_4H_6O_5$	Whole herb, Stem	[4, 23]
113	Gluconic acid	$C_6H_{12}O_7$	Whole herb	[4]
114	Mucic acid	$C_6H_9O_8$	Whole herb	[4]
115	Citric acid	$C_6H_8O_7$	Whole herb, Stem	[1, 9, 23]
116	Phenylpyruvic acid	$C_9H_8O_3$	Whole herb	[10]

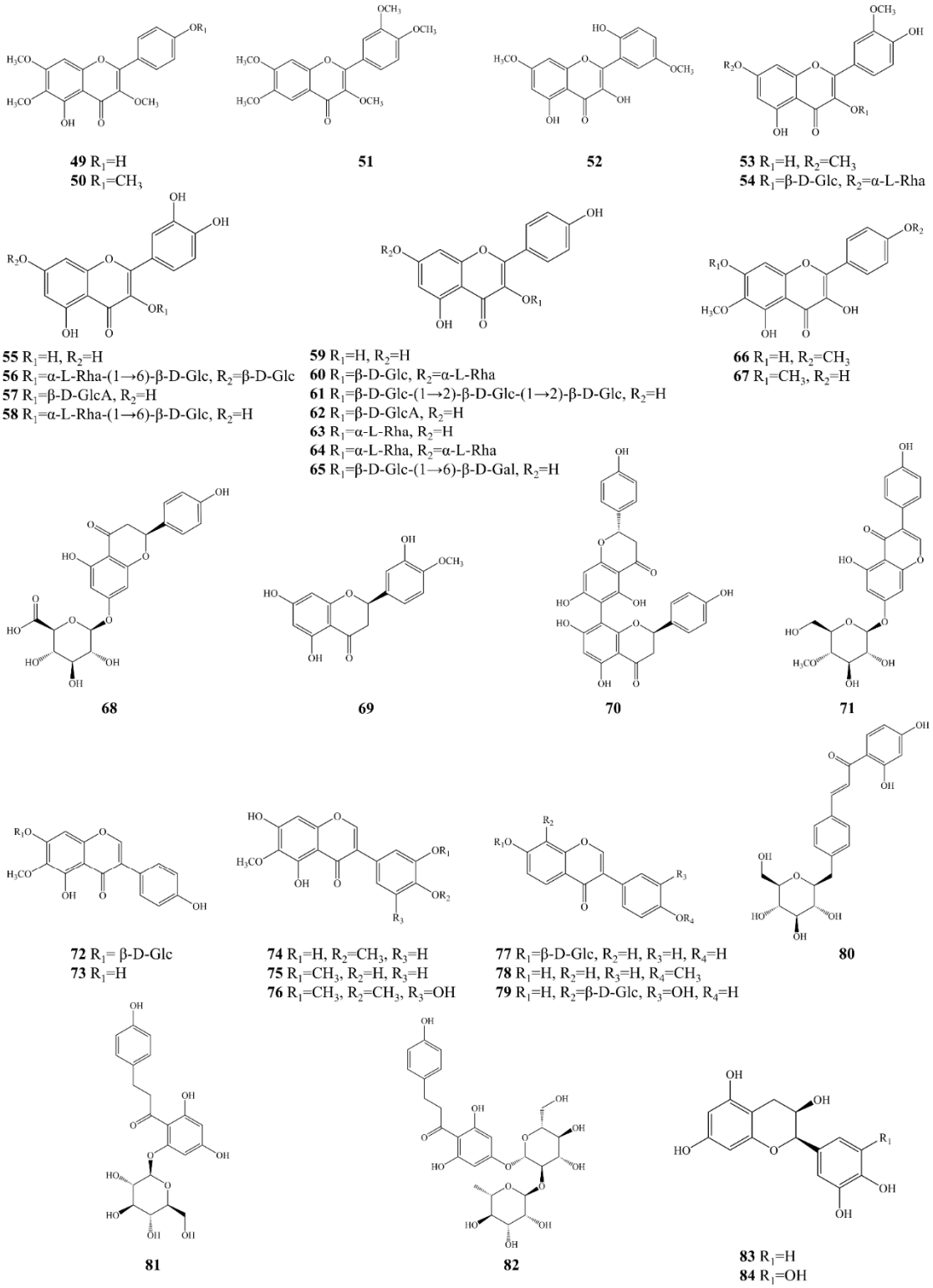
117	3-Methyladipic acid	$C_7H_{12}O_4$	Whole herb	[10]
118	Palmitic acid	$C_{16}H_{32}O_2$	Whole herb, Leave	[2, 4, 9, 24-26]
119	Linolenic acid	$C_{18}H_{30}O_2$	Whole herb, Leave	[1, 4, 9]
120	α-Eleostearic acid	$C_{18}H_{30}O_2$	Whole herb	[1]
121	Tetradecanoic acid	$C_{14}H_{28}O_2$	Leave	[24, 25]
122	Octadecanoic acid	$C_{18}H_{36}O_2$	Whole herb, Leave	[4, 25]
123	cis-9-Hexadecenoic acid	$C_{16}H_{30}O_2$	Leave	[25]
124	Hexadecenoic acid, Z-11-	$C_{16}H_{30}O_2$	Leave	[25]
125	Oleic Acid	$C_{18}H_{34}O_2$	Leave	[25]
126	Arachidonic acid	$C_{20}H_{32}O_2$	Whole herb, Leave	[4, 25]
127	Eicosanoic acid	$C_{20}H_{40}O_2$	Leave	[25]
128	Linoleic acid	$C_{18}H_{32}O_2$	Whole herb, Leave	[4, 25, 26]
129	6-Octadecenoic acid	$C_{18}H_{34}O_2$	Leave	[25]
130	cis-13-Octadecenoic acid	$C_{18}H_{34}O_2$	Leave	[25]
131	cis-Vaccenic acid	$C_{18}H_{34}O_2$	Leave	[25]
132	17-Hydroxylinolenic acid	$C_{18}H_{30}O_3$	Whole herb	[4]
133	Erucic acid	$C_{22}H_{42}O_2$	Whole herb	[26]
134	Pentadecanoic acid	$C_{15}H_{30}O_2$	Whole herb	[4]
135	2-Hydroxypalmitic acid	$C_{16}H_{32}O_3$	Whole herb	[4]
Terpenoids				
136	β-Pinene	$C_{10}H_{16}$	Leave	[23]
137	Camphene	$C_{10}H_{16}$	Leave	[24]
138	β-Myrcene	$C_{10}H_{16}$	Leave	[24]
139	(E)-Ocimene	$C_{10}H_{16}$	Leave	[24]
140	cis-Carveol	$C_{10}H_{16}O$	Leave	[24]
141	trans-Carveol	$C_{10}H_{16}O$	Leave	[24]
142	Terpinolene	$C_{10}H_{16}$	Leave	[24]
143	Geraniol	$C_{10}H_{18}O$	Leave	[24]
144	Linalool	$C_{10}H_{18}O$	Leave	[24]
145	Linalool oxide	$C_{10}H_{18}O_2$	Leave	[24]
146	Geranyl acetate	$C_{12}H_{20}O_2$	Leave	[24]
147	Terpinen-4-ol	$C_{10}H_{18}O$	Leave	[24]
148	Geranialdehyde	$C_{10}H_{16}O$	Leave	[23]
149	Safranal	$C_{10}H_{14}O$	Leave	[24]
150	trans-Pinocarveol	$C_{10}H_{16}O$	Leave	[23]
151	Verproside	$C_{22}H_{26}O_{13}$	Whole herb	[10]
152	Oleanolic acid	$C_{30}H_{48}O_3$	Whole herb	[4]
153	Eburicoic acid	$C_{31}H_{50}O_3$	Aerial part	[27]
154	Squalene	$C_{30}H_{50}$	Leave	[25, 26]
155	Phytol	$C_{20}H_{40}O$	Leave	[25]
Alkaloids				
156	Trigonelline	$C_7H_7NO_2$	Whole herb	[1, 2, 10]
157	Betaine	$C_5H_{11}NO_2$	Whole herb	[1, 10]
158	Nicotinamide	$C_6H_6N_2O$	Whole herb	[1]

159	Noroxyhydrastinine	$C_{10}H_9NO_3$	Whole herb	[10]
160	Aspergillus triazolate A	$C_{12}H_{21}N_3O_2$	Whole herb	[28]
Lignan				
161	Corniculin	$C_{21}H_{18}O_6$	Whole herb	[29]
Coumarins				
162	Scopolin	$C_{16}H_{18}O_9$	Whole herb	[1]
163	Hymecromone	$C_{10}H_8O_3$	Whole herb	[1]
164	4-Methoxycoumarin	$C_{10}H_8O_3$	Whole herb	[1]
165	Coumarin	$C_9H_6O_2$	Whole herb	[1]
166	Umbelliferone	$C_9H_6O_3$	Whole herb	[1]
167	10-O-Coumaroyl-10-O-deacetylasperuloside	$C_{25}H_{26}O_{12}$	Whole herb	[10]
Simple phenolics				
168	6-Gingerol	$C_{17}H_{26}O_4$	Whole herb	[1, 2]
169	Furanmethanol	$C_5H_6O_2$	Leave	[25]
170	Catechol	$C_6H_6O_2$	Leave	[19, 25]
171	5-Hydroxymethylfurfural	$C_6H_6O_3$	Leave	[25]
172	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	Leave	[25]
173	Ellagic Acid	$C_{14}H_6O_8$	Whole herb	[22]
Fatty acid esters				
174	Methyl palmitoleate	$C_{17}H_{32}O_2$	Whole herb	[4]
175	Ethyl linolenate	$C_{20}H_{34}O_2$	Whole herb	[4]
176	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	Leave	[25, 26]
177	9,12-Octadecadienoic acid, methyl ester, (E,E)	$C_{19}H_{34}O_2$	Leave	[26]
Anthraquinones				
178	Rhein	$C_{15}H_8O_6$	Whole herb	[5]
179	Ruberythric acid	$C_{25}H_{26}O_{13}$	Whole herb	[10]
180	Emodin-8-o-beta-gentiobioside	$C_{27}H_{30}O_{15}$	Whole herb	[10]
181	Chrysophanol 8-O-glucoside	$C_{21}H_{20}O_9$	Whole herb	[10]
Aldehydes				
182	Protocatechuic aldehyde	$C_7H_6O_3$	Whole herb	[1, 2]
183	Cinnamaldehyde	$C_9H_7O_9$	Whole herb	[4]
184	p-Hydroxybenzaldehyde	$C_7H_6O_2$	Whole herb	[5]
185	9,17-Octadecadienal, (Z)-	$C_{18}H_{32}O$	Leave	[25]
186	2-Isopropylbenzaldehyde	$C_{10}H_{12}O$	Leave	[24]
187	4-Propyl benzaldehyde	$C_{10}H_{12}O$	Leave	[24]
188	2,4-Decadienal	$C_{10}H_{16}O$	Leave	[24]
189	n-Nonanal	$C_9H_{18}O$	Leave	[24]
Glycoside				
190	β-sitosterol-3-O-beta-d-glucoside	$C_{35}H_{60}O_6$	Whole herb	[3]
191	Vanillyl beta - D - glucopyranoside	$C_{14}H_{20}O_8$	Whole herb	[4]
192	Rubrofusarin-6-O-beta-D-gentiobioside	$C_{27}H_{32}O_{15}$	Whole herb	[10]
Sterols				
193	β-Sitosterol	$C_{29}H_{50}O$	Leave	[9, 25, 30]

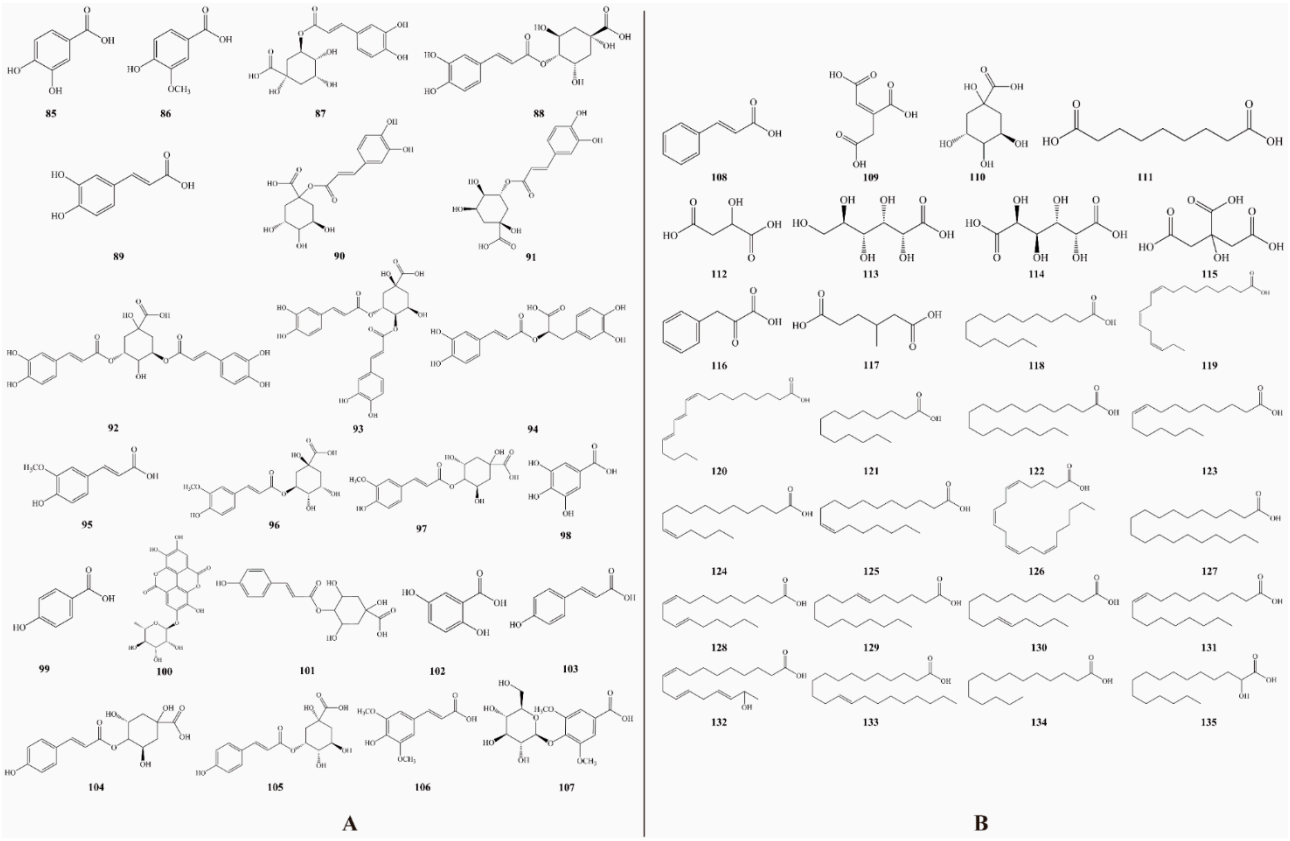
194	γ-Sitosterol	$C_{29}H_{50}O$	Leave	[25]
195	Campesterol	$C_{28}H_{48}O$	Leave	[25]
Carbohydrates				
196	D(-)-Fructose	$C_6H_{12}O_6$	Whole herb	[5]
197	Sucrose	$C_{12}H_{22}O_{11}$	Whole herb	[1]
Amino acid				
198	Tyrosine	$C_9H_{11}NO_3$	Whole herb	[1]
199	Leucine	$C_6H_{13}NO_2$	Whole herb	[1]
200	Arginine	$C_6H_{14}N_4O_2$	Whole herb	[1]
201	D-Pyroglutamic acid	$C_5H_7NO_3$	Whole herb	[1]
202	L-phenylalanine	$C_9H_{11}NO_2$	Whole herb	[1]
203	D-proline	$C_5H_9NO_2$	Whole herb	[10]
204	D-Leucine	$C_6H_{13}NO_2$	Whole herb	[10]
205	4-Aminobutyric acid	$C_4H_9NO_2$	Whole herb	[10]
Carotenoids and pigments				
206	Phytofluene	$C_{40}H_{62}$	Leave	[11]
207	Pheophorbide b	$C_{35}H_{34}N_4O_6$	Leave	[11]
208	Pheophytin a	$C_{55}H_{74}N_4O_6$	Leave	[11]
209	Pheophytin b	$C_{55}H_{72}N_4O_6$	Leave	[11]
210	All-E-neoxanthin	$C_{40}H_{56}O_4$	Leave	[11]
211	All-E-violaxanthin	$C_{40}H_{56}O_4$	Leave	[11]
212	All-E-lutein	$C_{40}H_{56}O_2$	Leave	[11]
213	Hydroxy-pheophytin a	/	Leave	[11]
214	Hydroxy-pheophytin a'	/	Leave	[11]
215	Hydroxy-pheophytin b	/	Leave	[11]
216	13-Hydroxy-chlorophyll b	/	Leave	[11]
217	Chlorophyll a	$C_{55}H_{72}MgN_4O_5$	Leave	[11]
218	Chlorophyll b	$C_{55}H_{70}MgN_4O_6$	Leave	[11]
219	Chlorophyll b'	$C_{55}H_{70}MgN_4O_6$	Leave	[11]
220	Chlorophyll b epimer	$C_{55}H_{70}MgN_4O_6$	Leave	[11]
Nucleosides and bases				
221	Guanosine	$C_{10}H_{13}N_5O_5$	Whole herb	[5, 10]
222	Adenine	$C_5H_5N_5$	Whole herb	[1, 5, 10]
Vitamins and metabolites				
223	Pantothenic acid	$C_9H_{17}NO_5$	Whole herb	[21]
224	Myo-Inositol	$C_6H_{12}O_6$	Whole herb	[10]
225	Vitamin C	$C_6H_8O_6$	Leave	[19, 23, 31]
226	α-Tocopherol	$C_{29}H_{50}O_2$	Leave	[19]
227	DL-alpha-Tocopherol	$C_{29}H_{50}O_2$	Leave	[25]



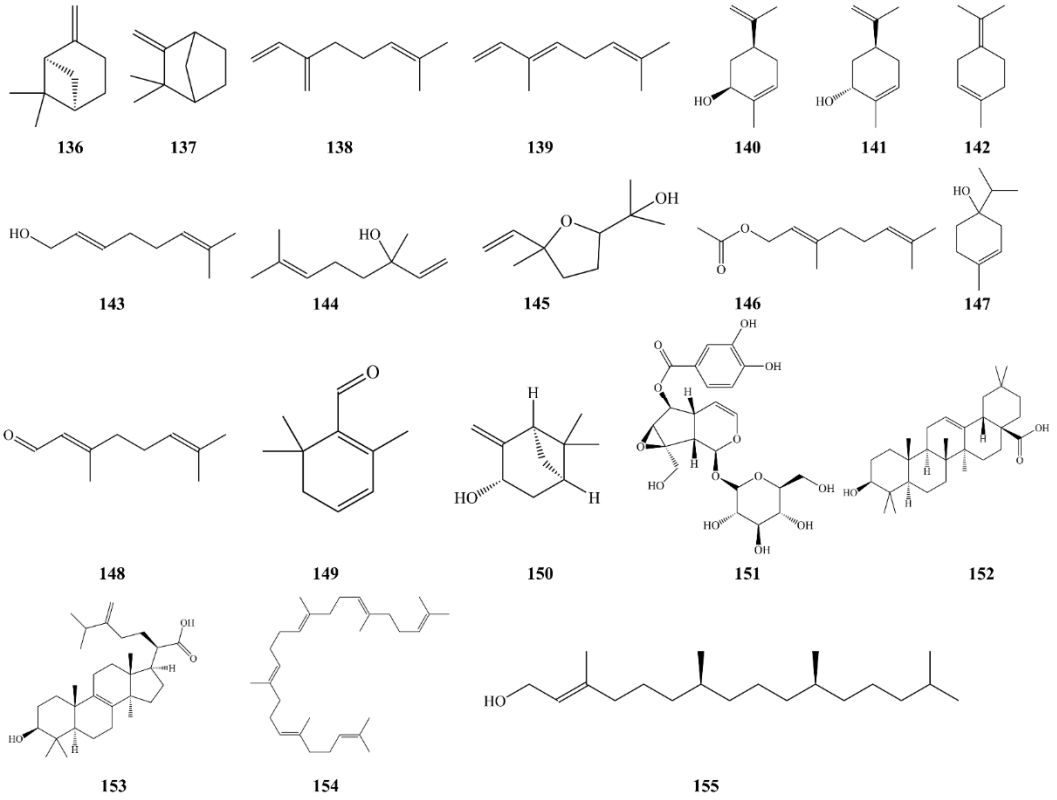
Supplemental Figure S1. Structures of flavones (1–48) isolated from *O. corniculata*.



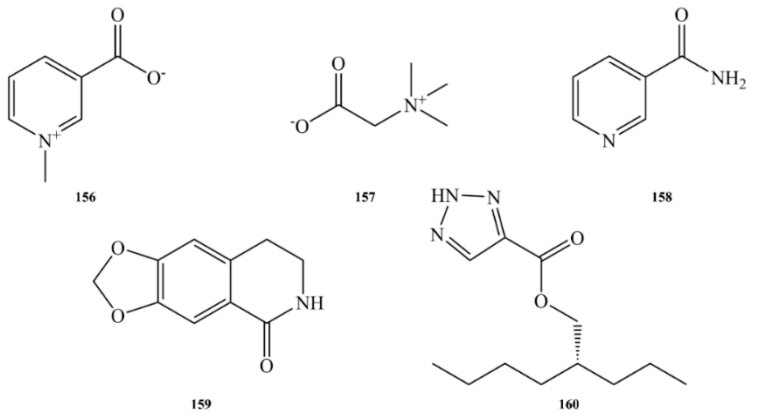
Supplemental Figure S2. Structures of other flavonoid subclasses isolated from *O. corniculata*, including flavonols (49–67), dihydroflavones (68–70), isoflavones (71–79), chalcone (80), dihydrochalcones (81–82), and flavanols (83–84).



Supplemental Figure S3. Structures of organic acids identified from *O. corniculata*. (A): Phenolic acids (85–107); (B): Other organic acids (108–135).



Supplemental Figure S4. Structures of terpenoids (136–155) identified from *O. corniculata*.



Supplemental Figure S5. Structures of alkaloids identified from *O. corniculata*.

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