

Supplementary Information

UHPLC-QQQ-MS and RP-HPLC detection of bioactive alizarin and scopoletin metabolites from *Morinda citrifolia* root extracts and their antitubercular, antibacterial, and antioxidant activities

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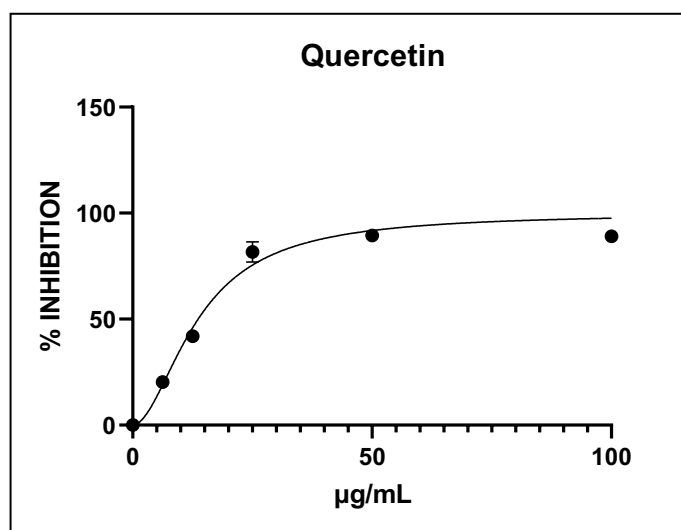
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2,2-Diphenyl-1-picrylhydrazyl (DPPH) Radical Scavenging Activity of Quercetin

Table S1. Scavenging activity (% inhibition) of quercetin against DPPH radical (N=3).

Concentration ($\mu\text{g/mL}$)	Quercetin		
	Inhibition (%)	SD	N
100	89.05	0.62	3
50	89.43	0.68	3
25	81.72	4.82	3
12.5	41.91	0.52	3
6.25	20.25	0.22	3
0	0	0	3

Figure S1. Inhibition curve of quercetin against DPPH radical (N=3).



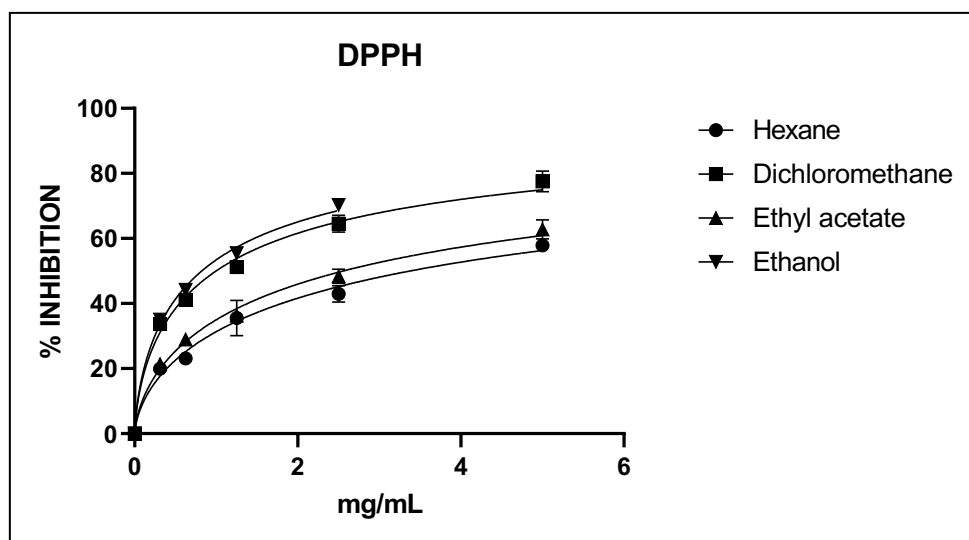
DPPH Radical Scavenging Activity of *Morinda citrifolia* Root Extracts

Table S2. Scavenging activity (% inhibition) of *M. citrifolia* root extracts against DPPH radical (N=3).

Concentration (mg/mL)	Hexane			Dichloromethane			Ethyl acetate			Ethanol		
	% INH	SD	N	% INH	SD	N	% INH	SD	N	% INH	SD	N
5	57.89	1.51	3	77.54	3.20	3	62.82	2.96	3	-	-	-
2.5	42.98	2.51	3	64.56	2.61	3	48.34	2.18	3	70.32	1.17	3
1.25	35.54	5.42	3	51.17	0.95	3	36.26	1.14	3	55.46	0.65	3
0.625	23.08	1.17	3	41.13	0.56	3	29.00	0.34	3	44.19	0.99	3
0.3125	19.93	0.57	3	33.69	1.90	3	21.39	1.00	3	35.04	1.62	3
0	0	0	3	0	0	3	0	0	3	0	0	3

INH = Inhibition.

Figure S2. Inhibition curve of *M. citrifolia* roots extracts against DPPH radical (N=3).

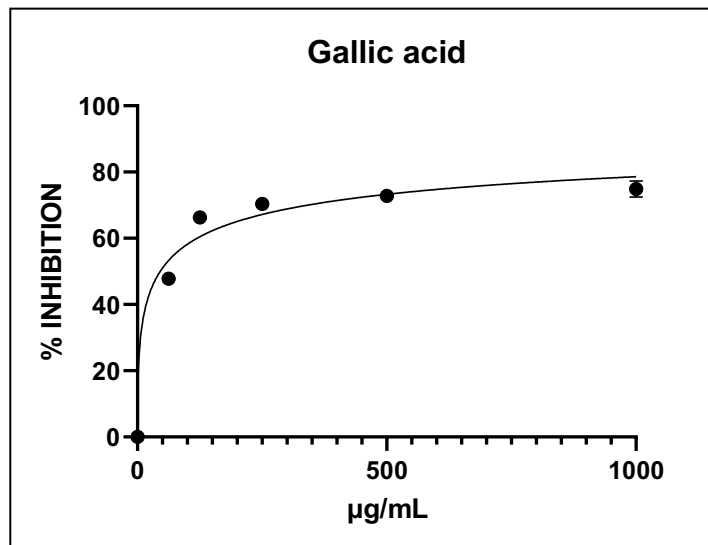


Nitric Oxide (NO) Radical Scavenging Activity of Gallic acid

Table S3. Scavenging activity (% inhibition) of gallic acid against NO radical (N=3).

Concentration ($\mu\text{g/mL}$)	Inhibition (%)	Gallic acid SD	N
1000	74.88	2.39	3
500	72.76	1.67	3
250	70.34	1.12	3
125	66.33	0.77	3
62.5	47.77	0.46	3
0	0	0	3

Figure S3. Inhibition curve of gallic acid against NO radical (N=3).



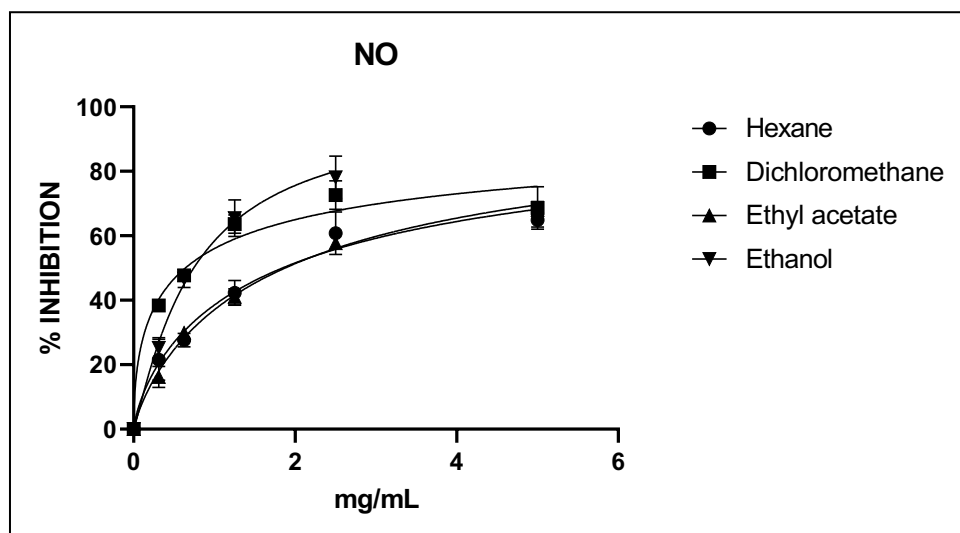
NO Radical Scavenging Activity of *M. citrifolia* Root Extracts

Table S4. Scavenging activity (% inhibition) of *M. citrifolia* roots extracts against NO radical (N=3).

Concentration (mg/mL)	Hexane			Dichloromethane			Ethyl acetate			Ethanol		
	% INH	SD	N	% INH	SD	N	% INH	SD	N	% INH	SD	N
5	64.85	2.16	3	68.61	6.62	3	68.06	2.63	3	-	-	-
2.5	60.79	6.61	3	72.64	4.40	3	57.74	1.64	3	78.15	6.59	3
1.25	42.30	3.82	3	63.61	2.81	3	41.02	2.52	3	65.45	5.65	3
0.625	27.61	2.10	3	47.75	1.19	3	29.84	1.05	3	46.69	2.80	3
0.3125	21.55	6.32	3	38.41	0.99	3	16.23	3.26	3	25.24	3.17	3
0	0	0	3	0	0	3	0	0	3	0	0	3

INH = Inhibition.

Figure S4. Inhibition curve of *M. citrifolia* root extracts against NO radical (N=3).

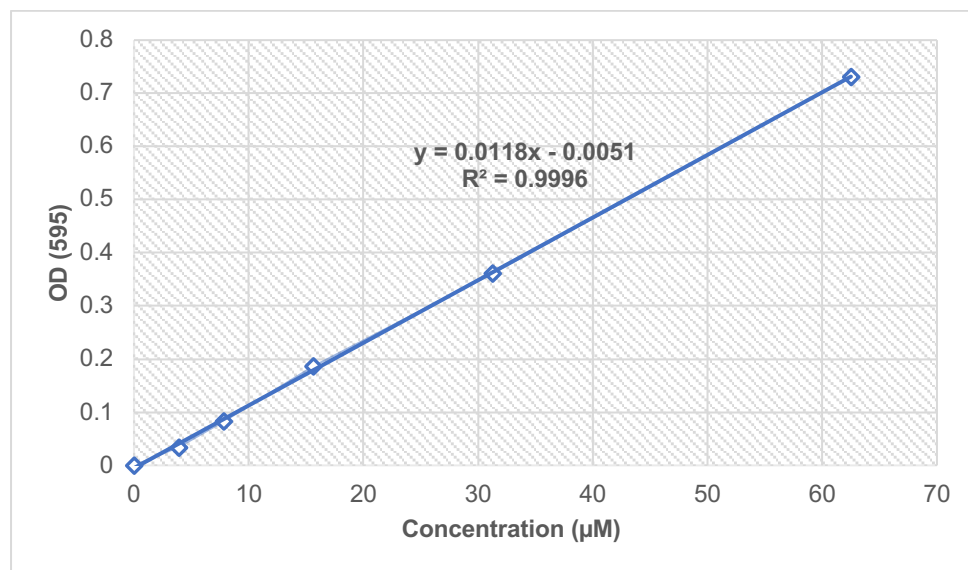


Ferric Reducing Ability Power (FRAP) of *M. citrifolia* Root Extracts

Table S5. FRAP assay of *M. citrifolia* root extracts.

Extracts	FRAP value (mM FeSO ₄ /g extract)			
	1	2	3	Mean ± SD
Hexane	2.71	2.16	2.17	2.35 ± 0.31 ^a
Dichloromethane	3.90	4.28	3.74	3.97 ± 0.28 ^b
Ethyl acetate	3.91	4.06	3.79	3.92 ± 0.14 ^b
Ethanol	5.10	5.05	4.92	5.02 ± 0.09 ^c

Figure S5. Standard calibration curve of ferrous sulfate (FeSO₄).



Quantification of Alizarin and Scopoletin by Reverse-Phase High-Performance Liquid Chromatography (RP- HPLC)

Figure S6. RP-HPLC standard curves of alizarin ($\lambda=250$ nm) and scopoletin ($\lambda=350$ nm).

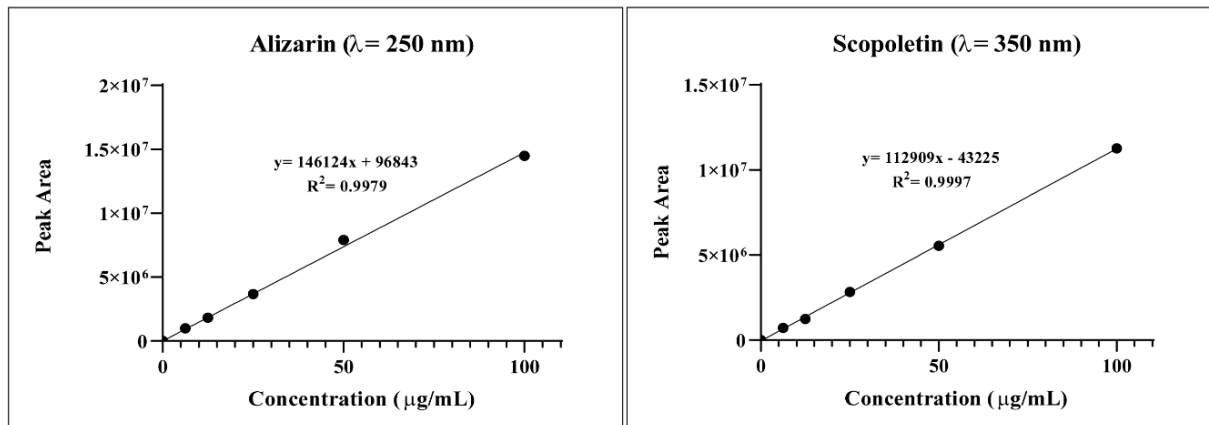


Figure S7. $^1\text{H-NMR}$ (300 MHz, in CDCl_3) spectrum of hexane *M. citrifolia* root extract.

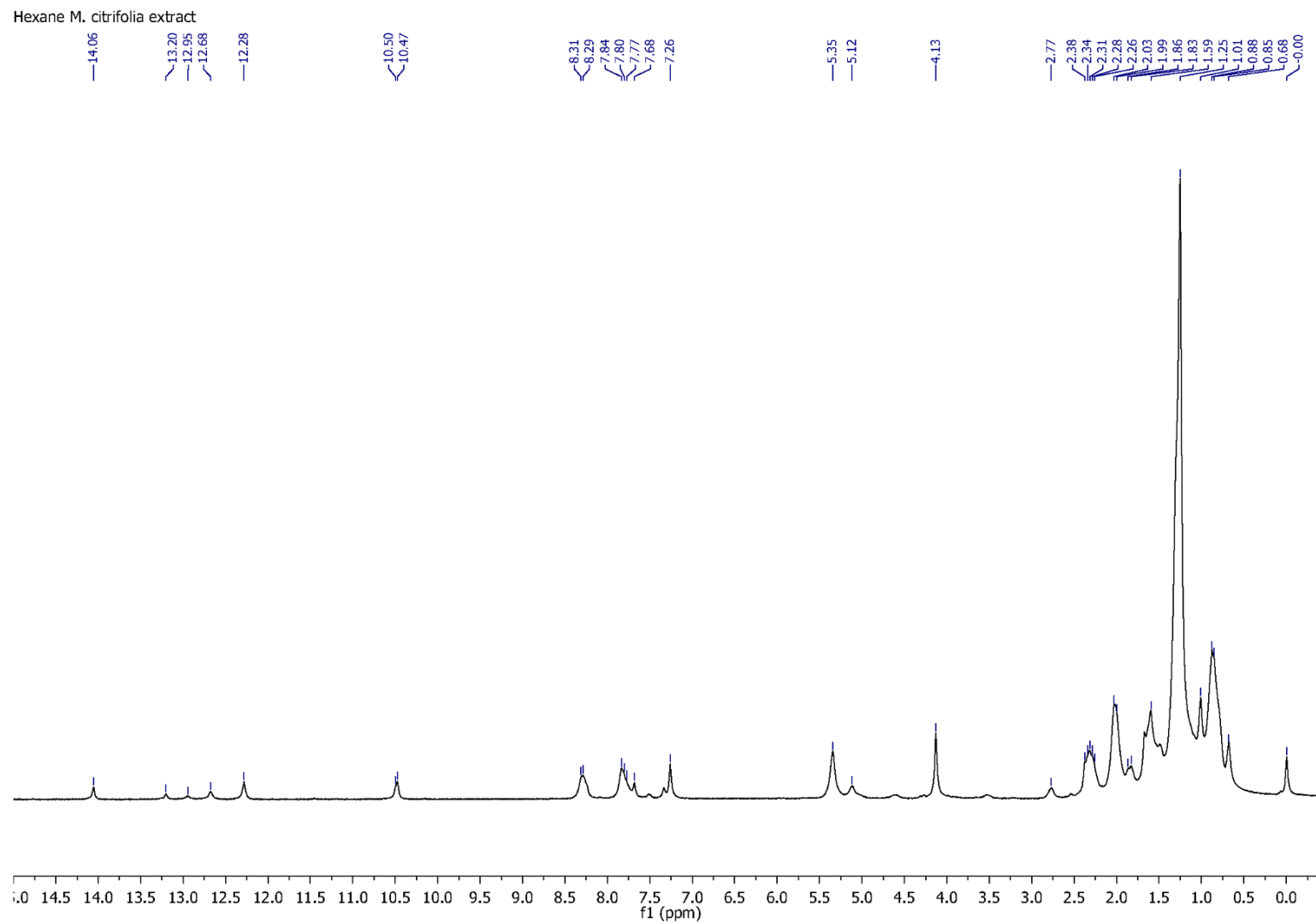


Figure S8. $^1\text{H-NMR}$ (300 MHz, in CDCl_3) spectrum of dichloromethane *M. citrifolia* root extract.

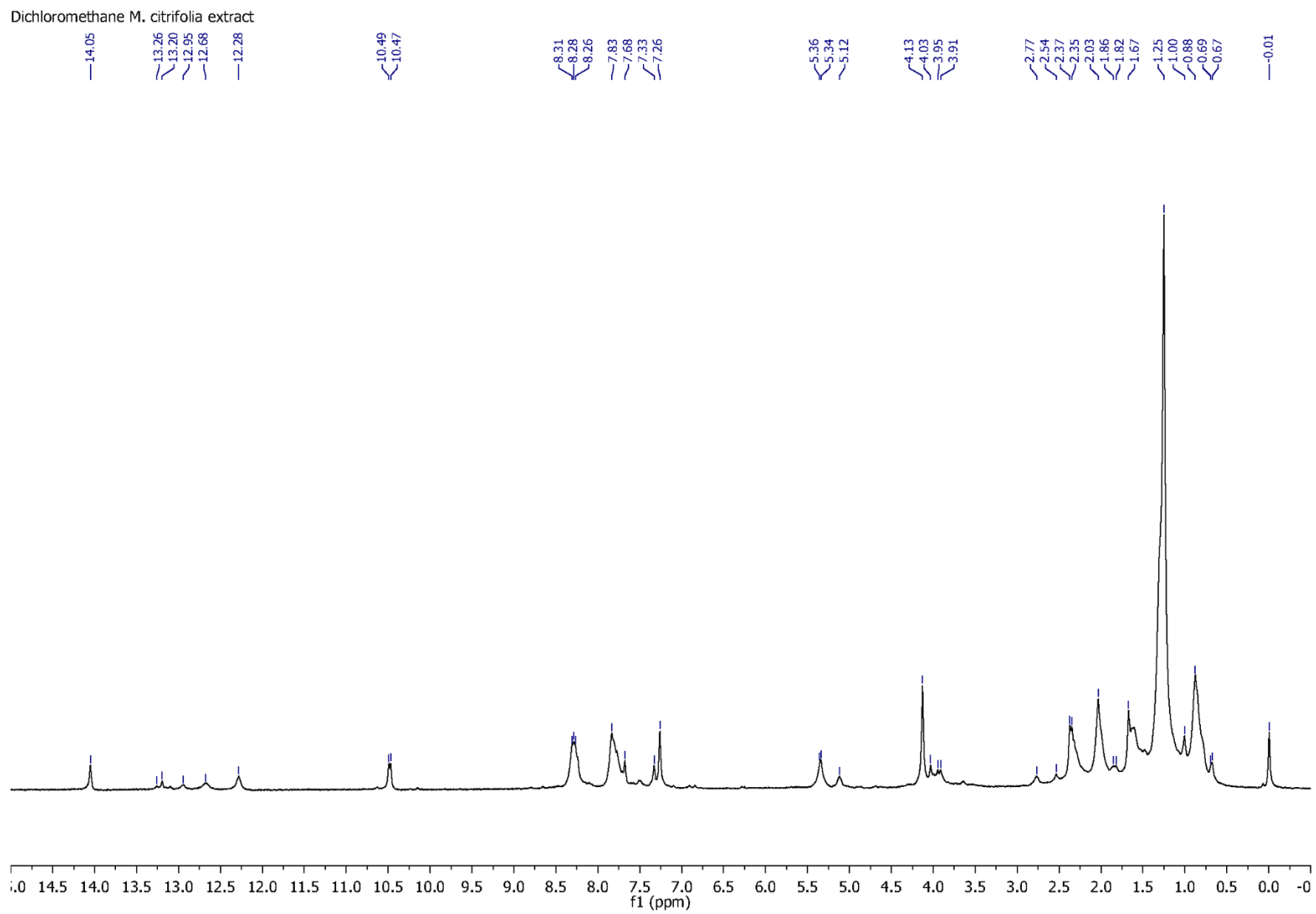


Figure S9. $^1\text{H-NMR}$ (300 MHz, in acetone- d_6) spectrum of ethyl acetate *M. citrifolia* root extract.

Ethyl acetate *M. citrifolia* extract

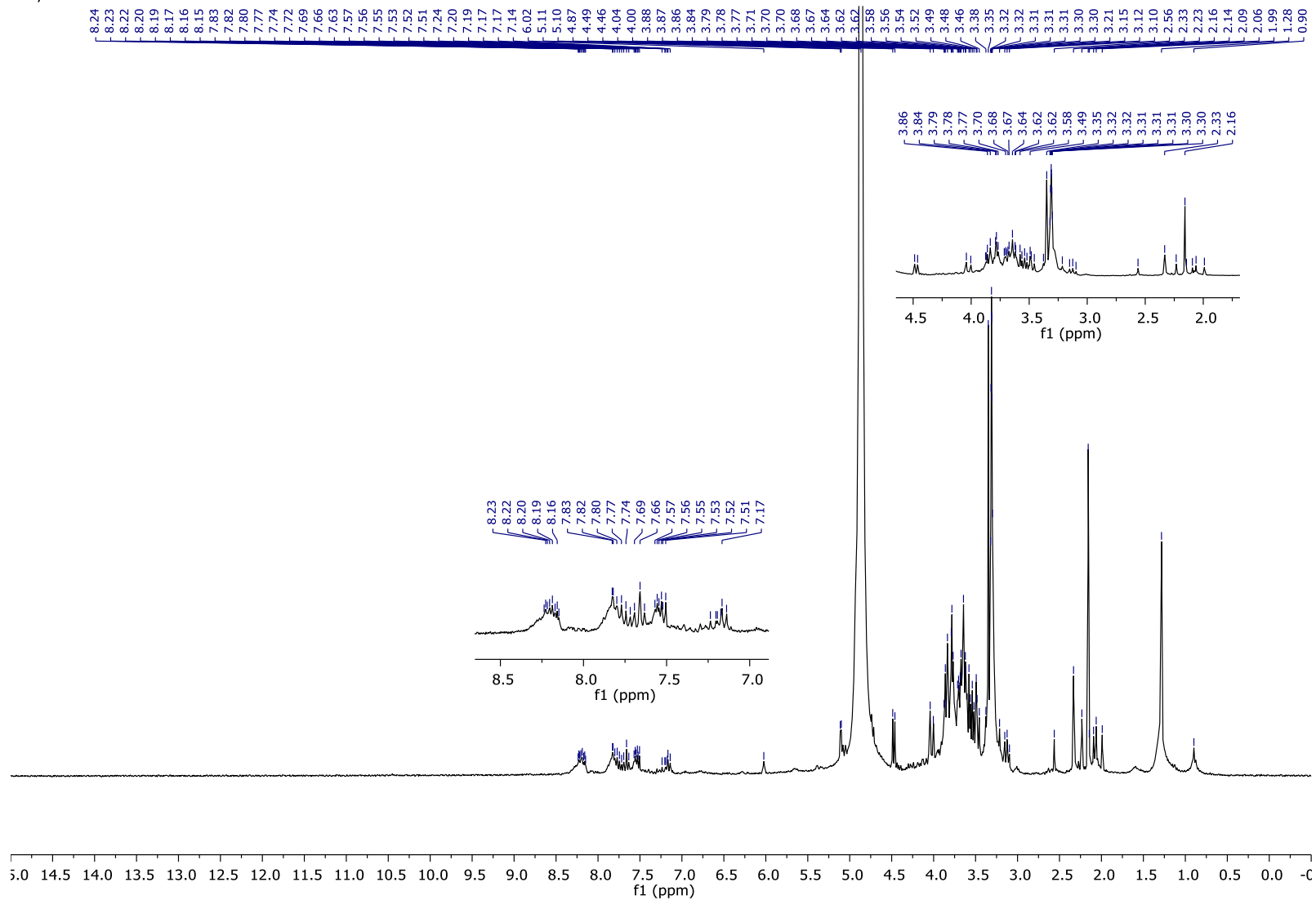


Figure S10. $^1\text{H-NMR}$ (300 MHz, in CD_3OD) spectrum of ethanol *M. citrifolia* root extract.

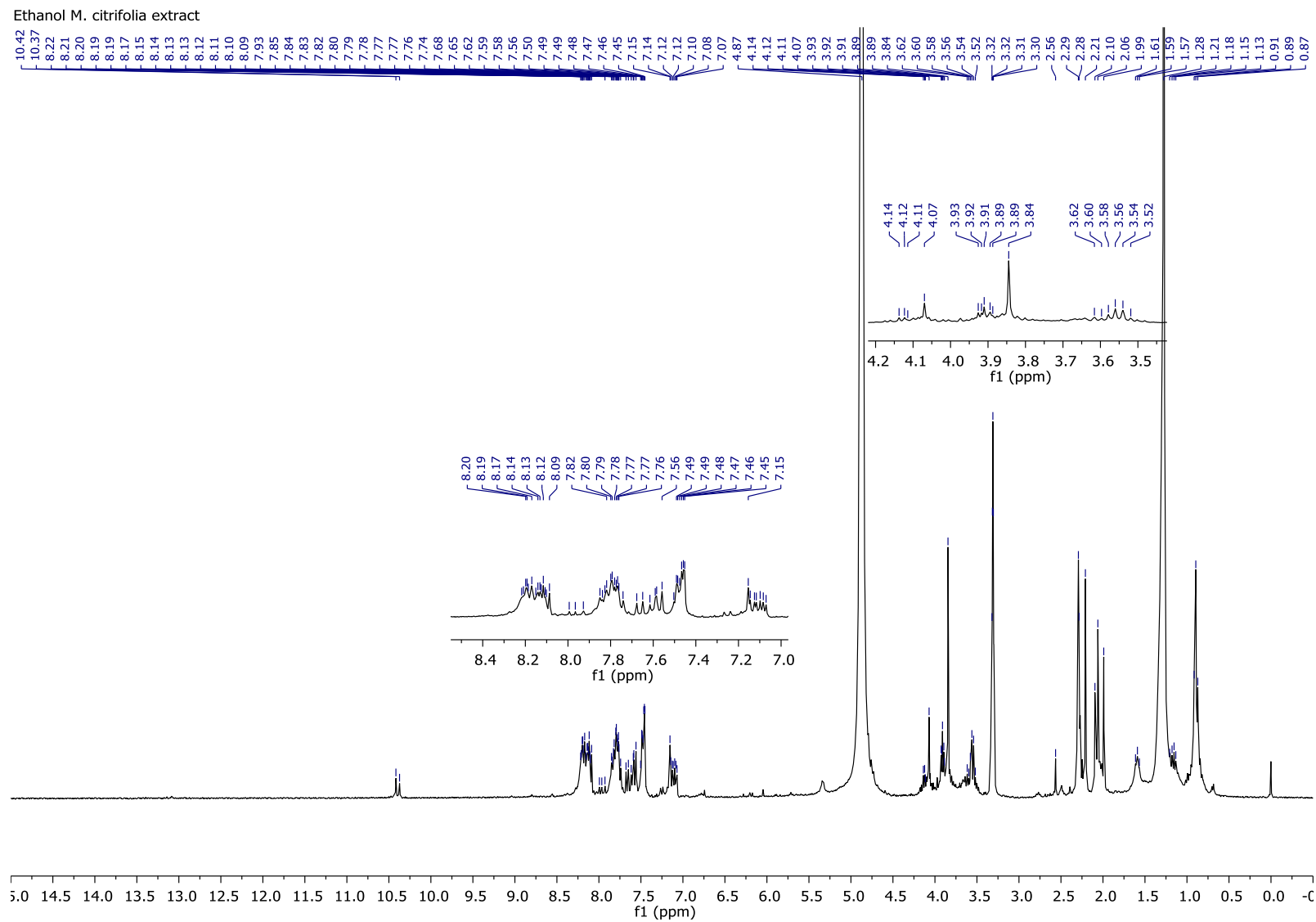


Figure S11. UHPLC-QQQ-MS chromatogram of alizarin in the dichloromethane *M. citrifolia* root extract.

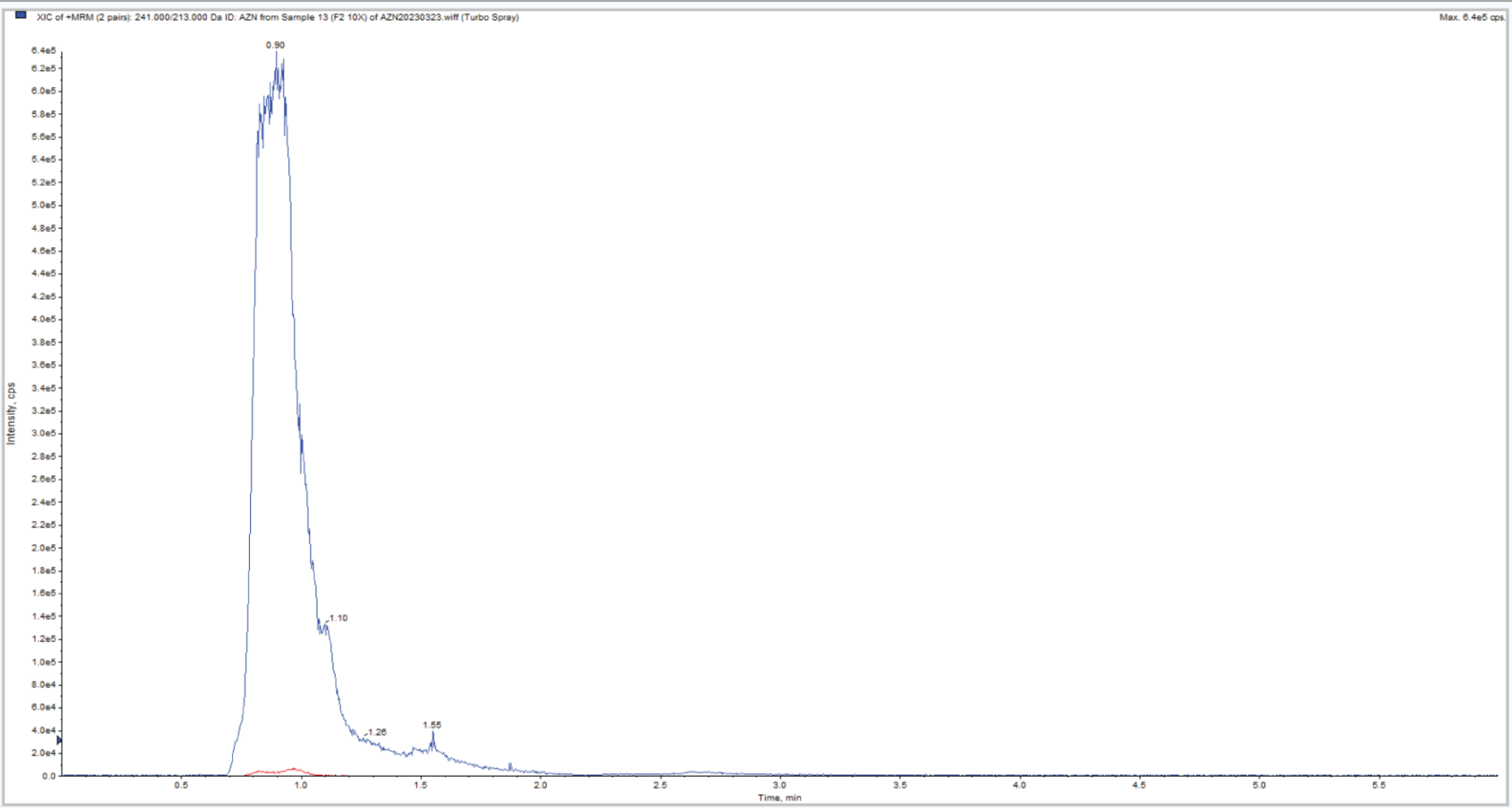


Figure S12. UHPLC-QQQ-MS chromatogram of alizarin in the ethyl acetate *M. citrifolia* root extract.

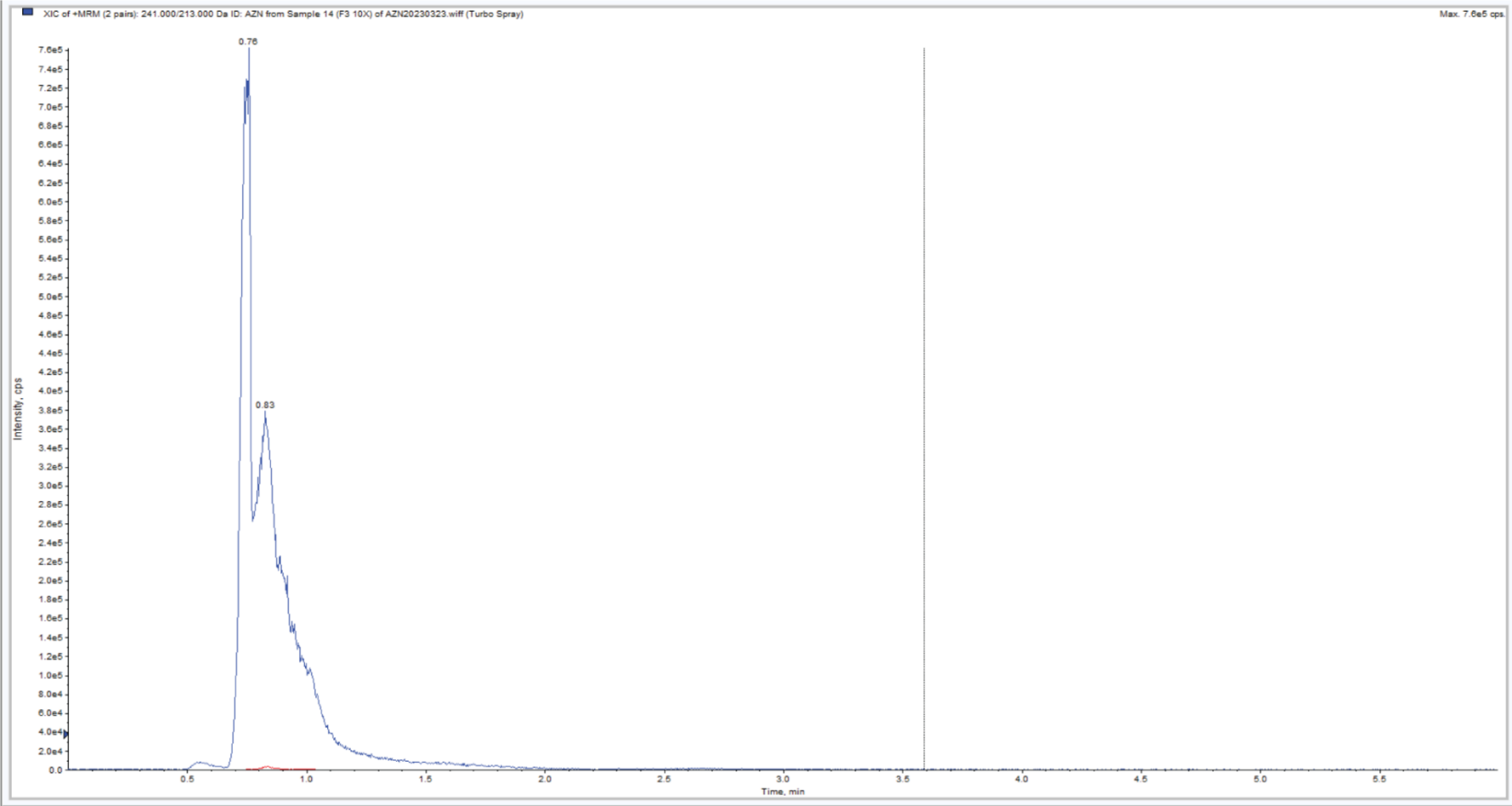


Figure S13. UHPLC-QQQ-MS chromatogram of alizarin in the ethanol *M. citrifolia* root extract.

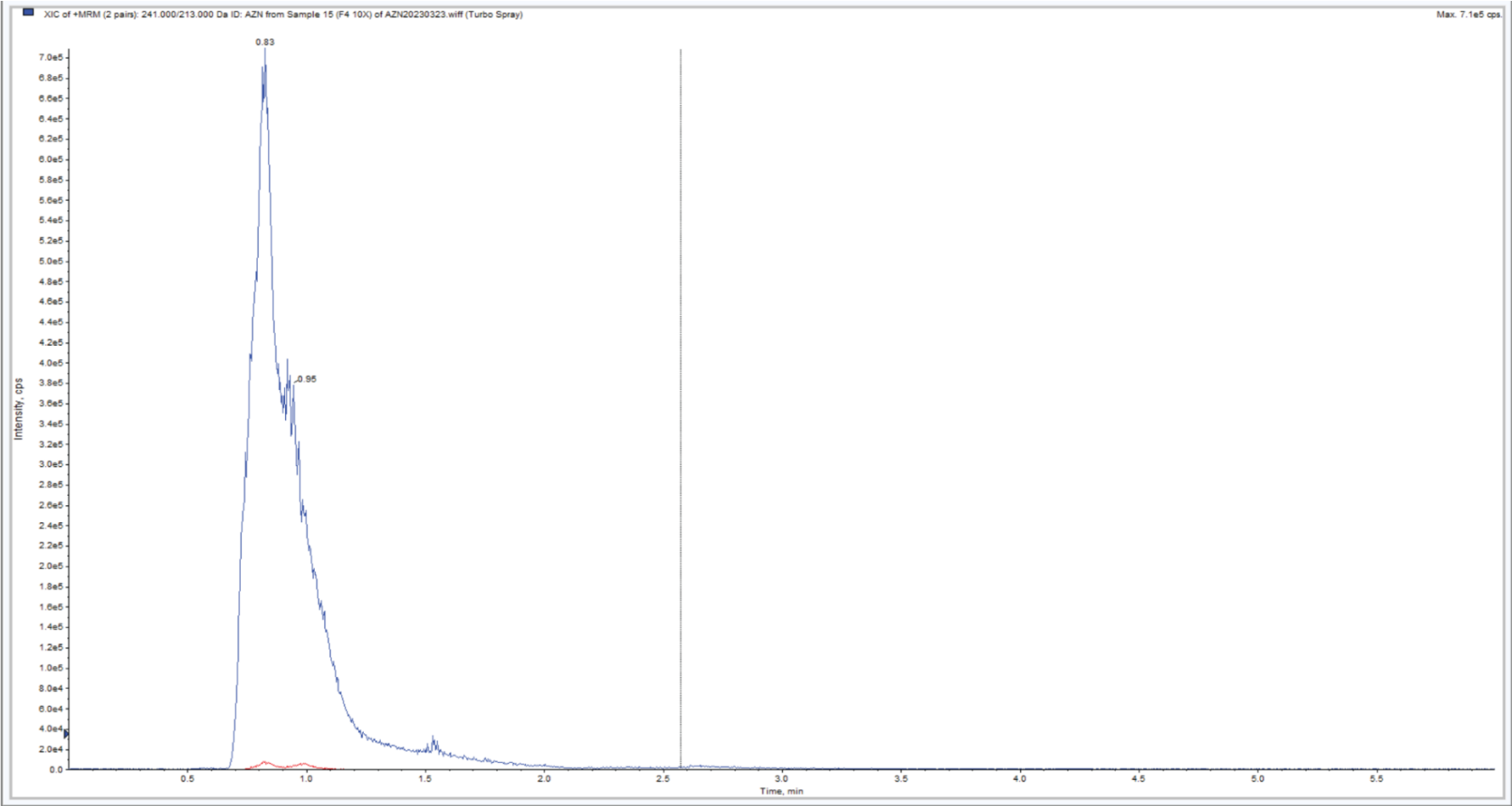


Figure S14. UHPLC-QQQ-MS chromatogram of scopoletin in the dichloromethane *M. citrifolia* root extract.

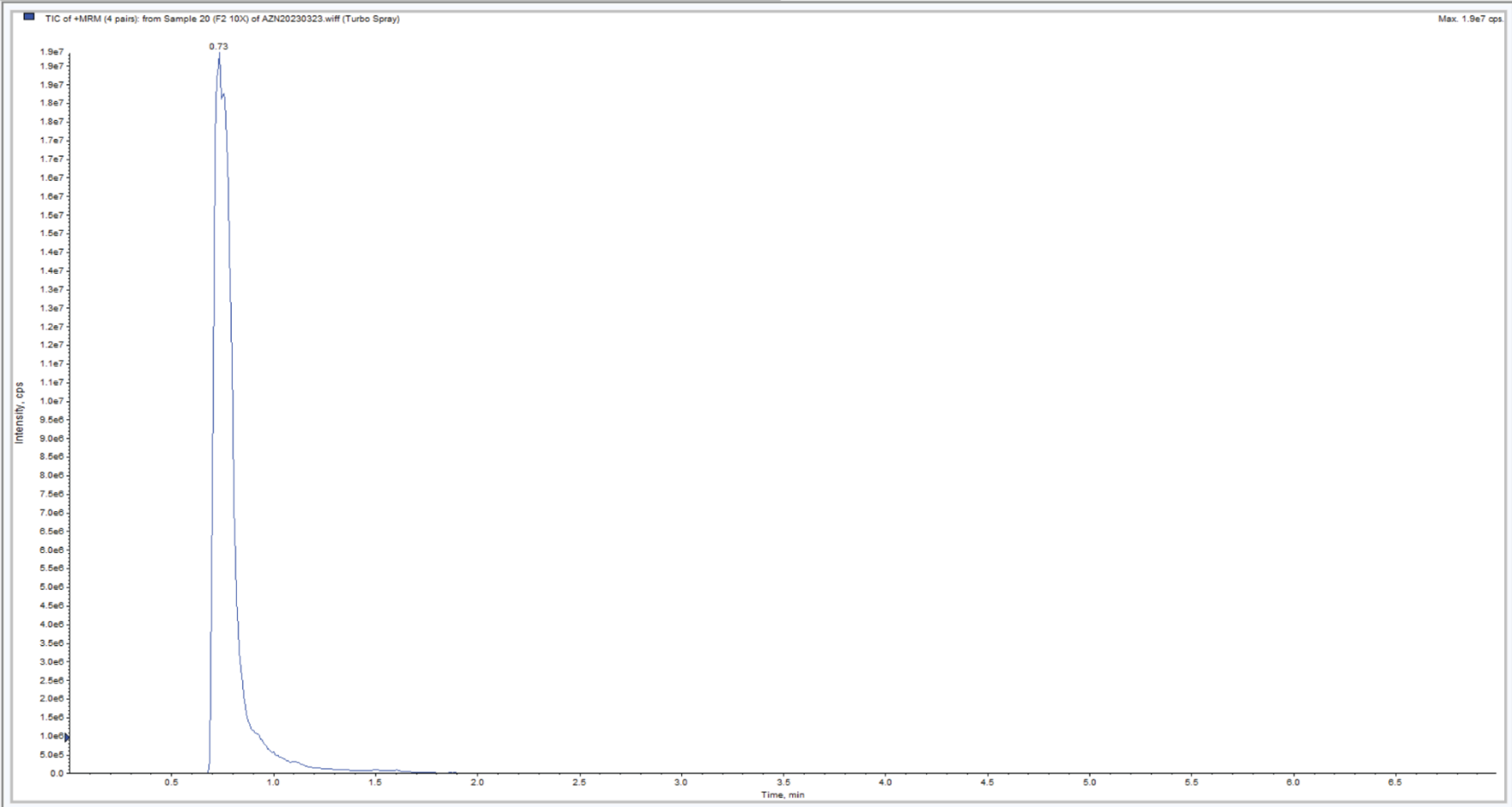


Figure S15. UHPLC-QQQ-MS chromatogram of scopoletin in the ethyl acetate *M. citrifolia* root extract.



Figure S16. UHPLC-QQQ-MS chromatogram of scopoletin in the ethanol *M. citrifolia* root extract.

