

Supplementary Material

Antioxidant activities

Determination of total polyphenols (TP)

To start, 25 μ L (25% Folin–Ciocalteu reagent v/v) with 200 μ L water (Milli-Q) were added to 25 μ L of sample extracts in 96-well plates. Then, the plate was incubated for 5 min at 25 °C. Finally, 25 μ L (10% v/v sodium carbonate) were added in reaction mixture and placed in the dark for 60 min at 25 °C and absorbance was recorded at 765 nm. The TPC was quantified by constructing the standard curve against gallic acid ranging from 0 to 200 μ g/mL in ethanol. The results were documented as milligram gallic acid equivalents (GAE) per gram dry weight of samples.

Determination of total flavonoids (TF)

In this, 80 μ L of the sample extract were mixed with 80 μ L 2% aluminum chloride solution and 120 μ L sodium acetate aqueous solution (50 g/L) in 96-well plates. The reaction mixture was placed in the dark at 25 °C for 2.5 h and absorbance was recorded at 440 nm. Measurement of all samples were made in triplicate and TFC were quantified by constructing a standard curve against 0–50 μ g/mL quercetin in methanol. The results were expressed as milligram quercetin equivalents (QE) per gram dry weight of the samples ($r^2 = 0.999$).

Determination of total tannins (TT)

To do this, 25 μ L of sample solution was mixed with 150 μ L of 4% vanillin solution in a 96-well plate. A total of 25 μ L of 32% sulfuric acid was added to the mixture and allowed to incubate at 25 °C for 15 min and absorbance was recorded at 500 nm. Measurements for all samples was made in triplicate and quantification was done by constructing a standard curve with 0–1000 μ g/mL catechin solution in methanol. The results were expressed as mg catechin equivalents (CE) per gram dry weight of the samples.

DPPH assay

To do this, 25 μ L sample extract and 275 μ L 0.1 M solution of DPPH in methanol were mixed in 96-well plate method. The reaction mixture was placed in the dark for 30 min at room temperature and absorbance was recorded at 517 nm. Anti-radical capacity of all the samples was estimated by constructing the standard curve against 0–50 μ g/mL ascorbic acid in water. The results were expressed as milligram ascorbic acid equivalents per gram dry weight of the samples (mg AAE/g).

FRAP assay

An aliquot of 20 μ L was mixed with 280 μ L FRAP reagent (mixture of 20 mM ferric chloride, 10 mM TPTZ solution and 300 mM sodium acetate buffer in the v/v ratio of 1:1:1). The mixture was kept for 10 minutes at 37 °C. before the plate reading at 593 nm. The ferric reducing antioxidant property was subsequently calculated and expressed as mg AAE/g.

ABTS radical scavenging assay

To do this, 7 mM ABTS solution was mixed with 140 mM potassium persulfate solution. The reaction mixture was allowed to incubate in the dark for 16 h to generate an ABTS⁺ solution. The ABTS⁺ solution was diluted with ethanol to make its absorbance to 0.70 ± 0.02 at 734 nm. After this, 10 μ L of sample extract was mixed with 290 μ L of ABTS⁺ solution in 96-well plate and allowed to incubate at 25 °C for 6 min and the absorbance was recorded at 734 nm. The quantification was completed by constructing the standard curve against 0–150 μ g/mL of ascorbic acid in water. The results were expressed as mg AAE/g.

Reducing Power Assay (RPA)

A total of 10 μ L extract, 25 μ L of 0.2 M phosphate buffer (pH 6.6), and 25 μ L of K₃[Fe(CN)₆] were added, sequentially followed by incubation at 25 °C for 20 min. Then, 25 μ L of 10% TCA solution was added to stop the reaction followed by the addition of 85 μ L of water and 8.5 μ L of FeCl₃ and incubated for further

15 min at 25 °C. Next, the absorbance was measured at a wavelength of 750 nm. Ascorbic acid from 0 to 300 µg/mL was used to obtain a standard curve and data was presented in mg AAE/g.

Hydroxyl radical scavenging activity ($\cdot\text{OH}$ -RSA)

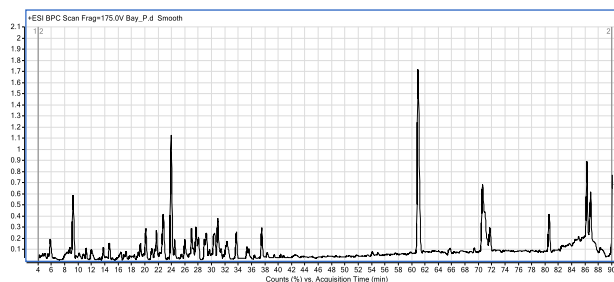
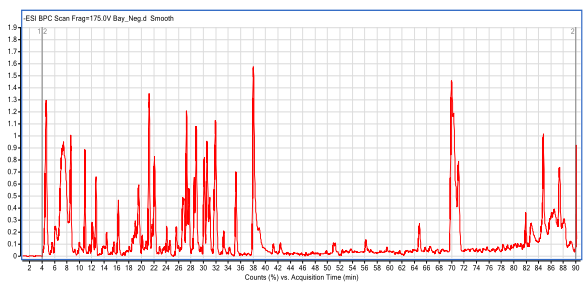
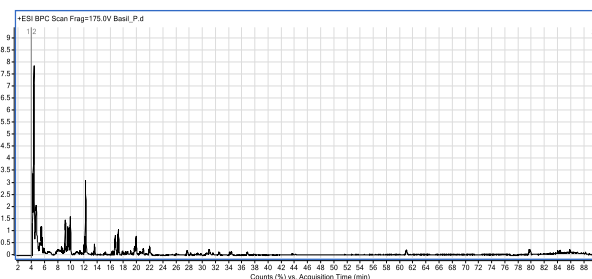
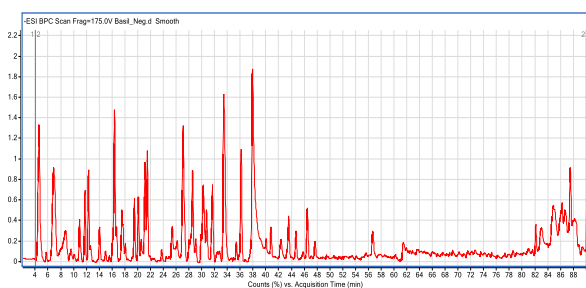
A 50 µL extract was mixed with 50 µL of 6 mM $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ and 50 µL of 6 mM H_2O_2 (30%), followed by incubation at 25 °C for 10 min. After incubation, 50 µL of 6 mM 3-hydroxybenzoic acid were added and absorbance was measured at a wavelength of 510 nm. Ascorbic acid from 0 to 300 µg/mL was used to obtain a standard curve and data was presented in mg AAE/g. The Fe^{2+} chelating activity of the samples were measured, according to Dinis, et al. [18] with modifications. A total of 15 µL extract was mixed with 85 µL of water, 50 µL of 2 mM ferrous chloride (with additional 1:15 dilution in water) and 50 µL of 5 mM ferrozine (with additional 1:6 dilution in water), followed by incubation at 25 °C for 10 min. Then the absorbance was measured at a wavelength of 562 nm. EDTA from concentrations of 0 to 50 µg/mL was used to obtain a standard curve and data was presented as mg EDTA/g.

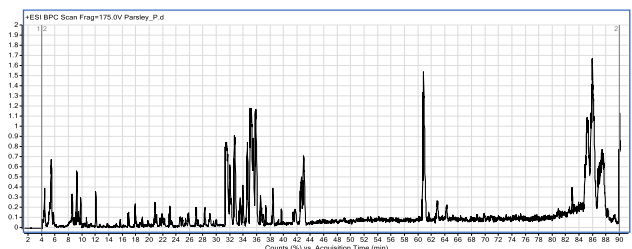
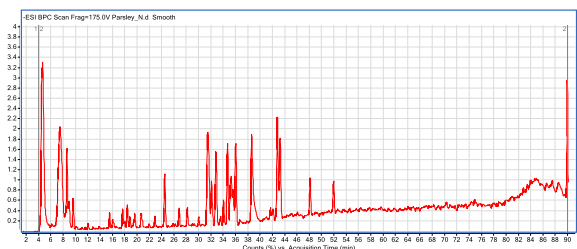
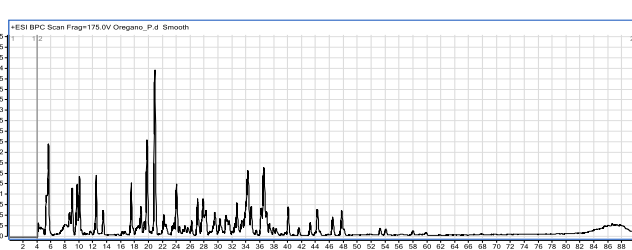
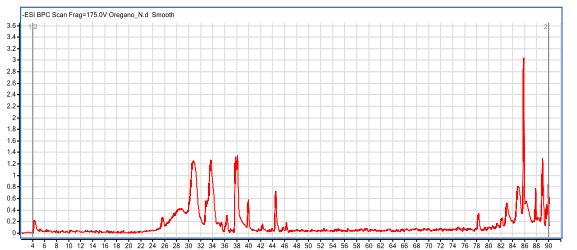
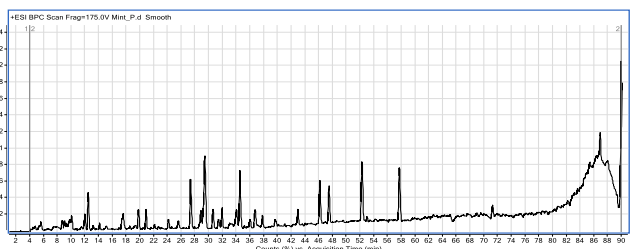
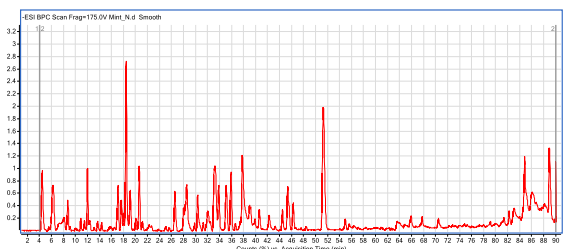
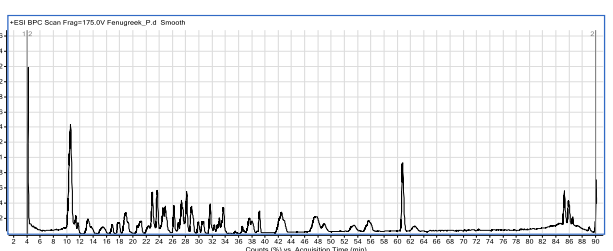
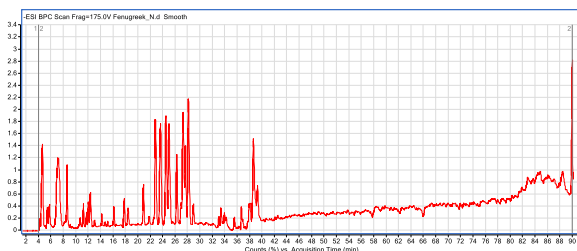
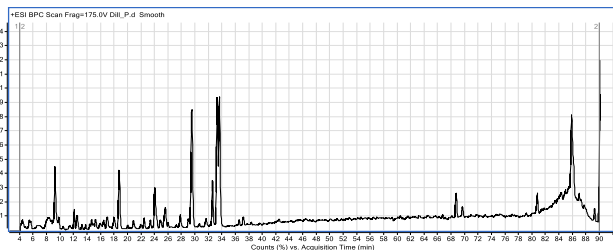
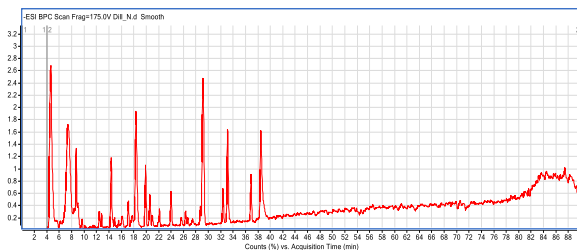
Ferrous ion chelating activity (FICC)

A total of 15 µL extract was mixed with 85 µL of water, 50 µL of 2 mM ferrous chloride (with additional 1:15 dilution in water) and 50 µL of 5 mM ferrozine (with additional 1:6 dilution in water), followed by incubation at 25 °C for 10 min. Then the absorbance was measured at a wavelength of 562 nm. EDTA from concentrations of 0 to 50 µg/mL was used to obtain a standard curve and data was presented as mg EDTA/g.

Phosphomolybdate antioxidant power assay (PMA)

For the PMA, 40 µL of each spice extract was added to 260 µL of phosphomolybdate reagent (0.6 M H_2SO_4 , 0.028 M sodium phosphate and 0.004 M ammonium molybdate). The mixture was incubated at 95 °C for 90 min, cooled at room temperature and absorbance was measured at 695 nm. A standard curve was generated using concentrations of 0–200 µg/mL ascorbic acid and the results were expressed as mg AAE/g





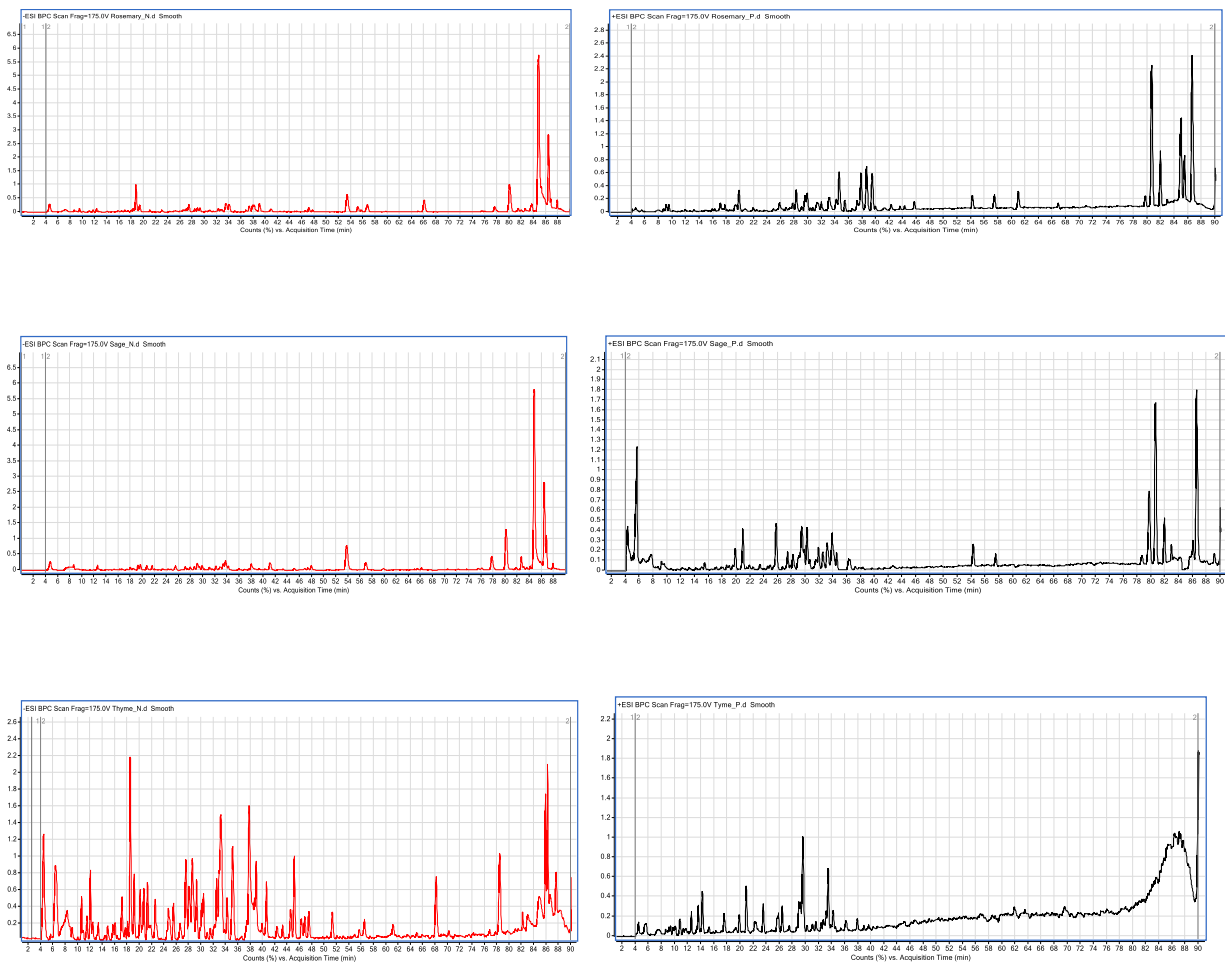
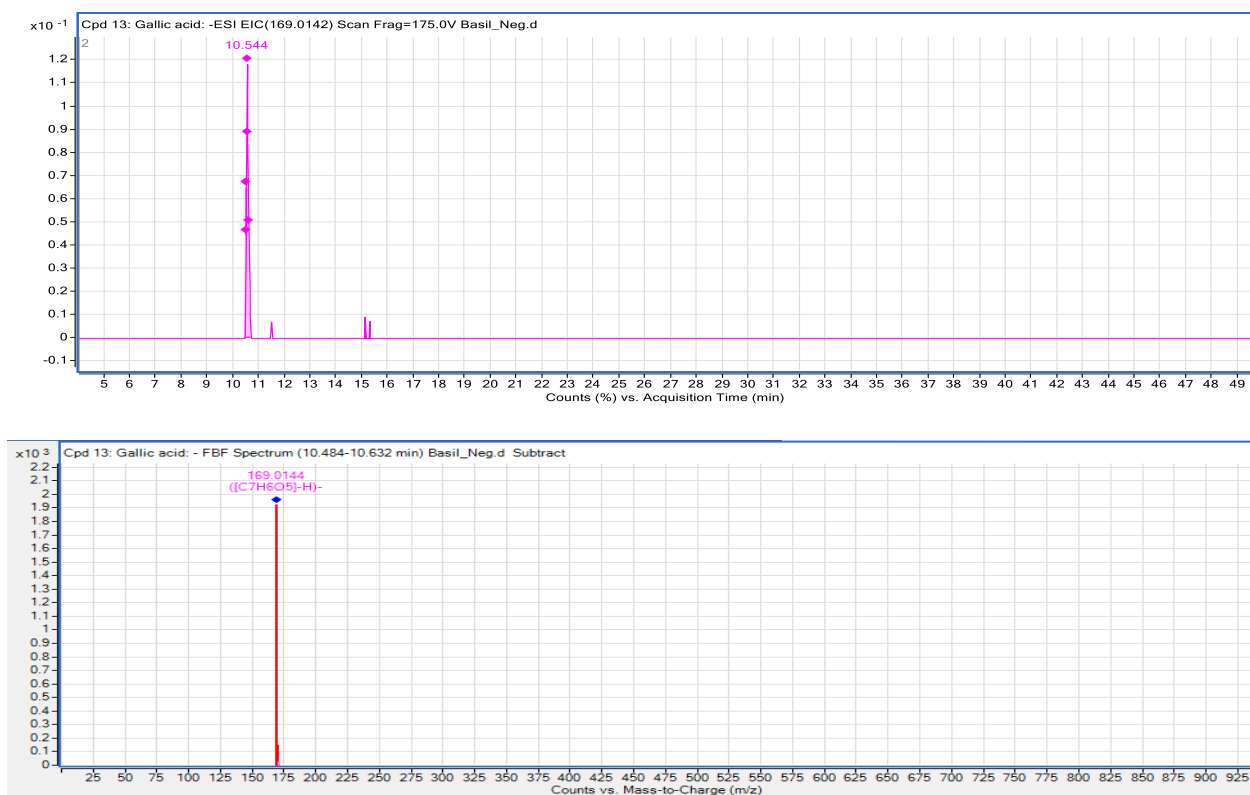
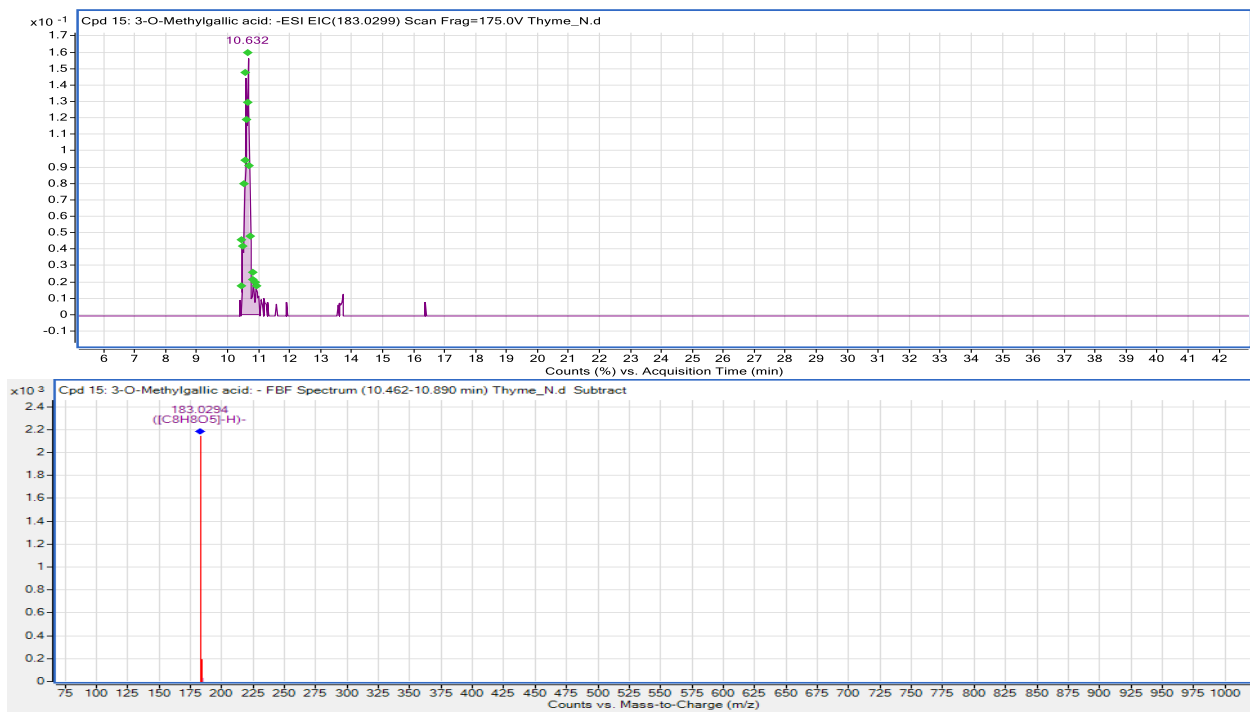


Figure S1. Base Peak Chromatograms (BPC) of 10 herbs in negative (red) and positive mode (black).

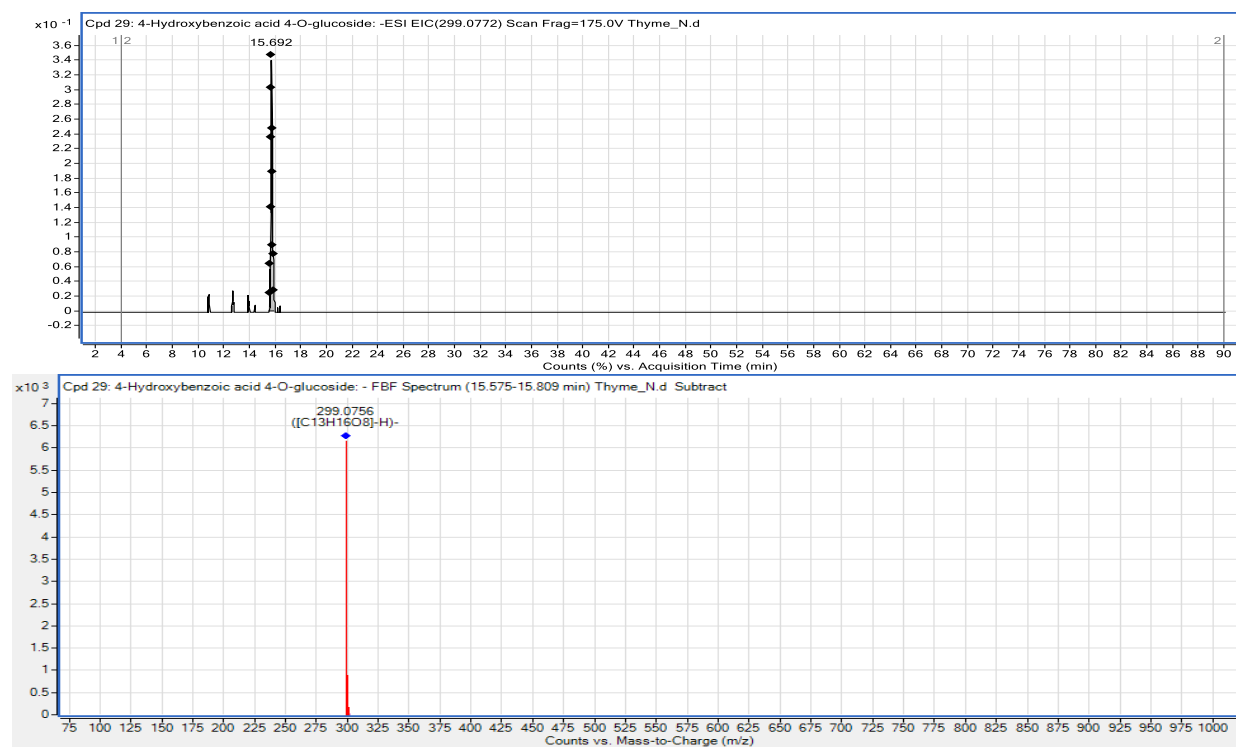
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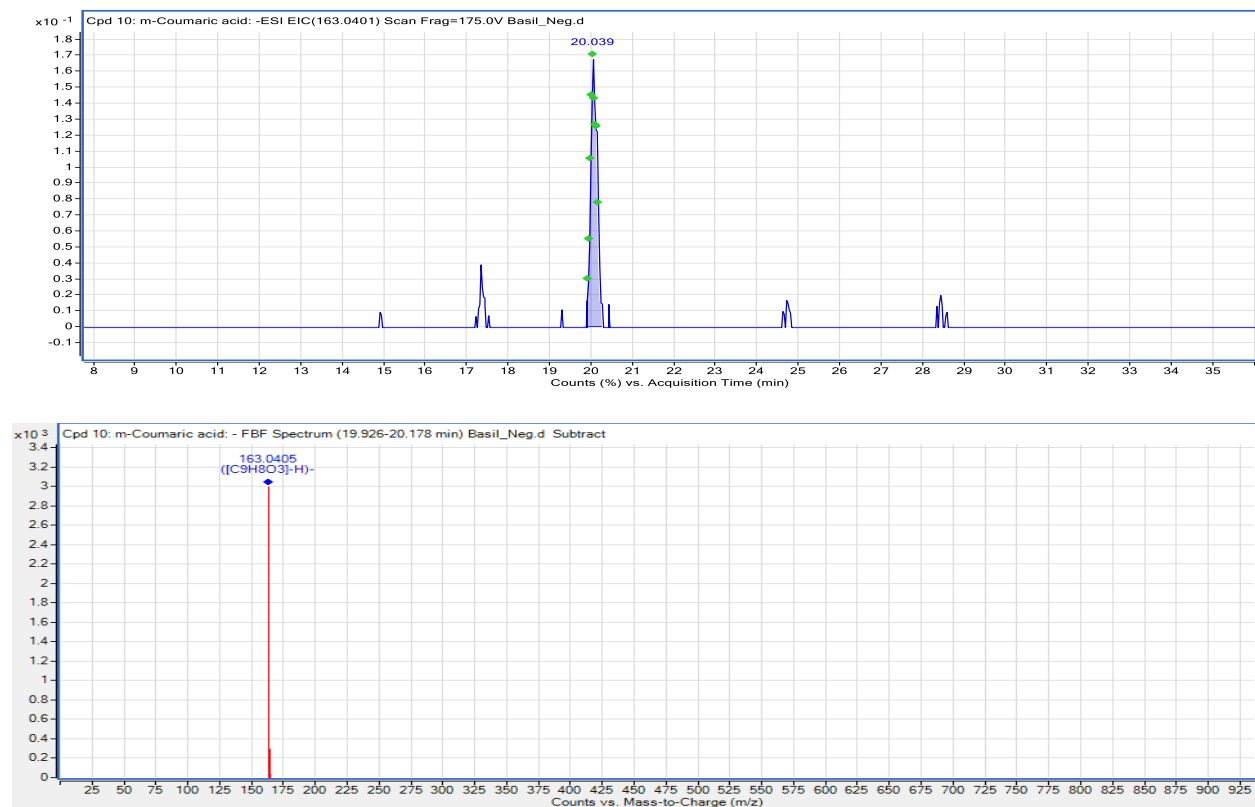
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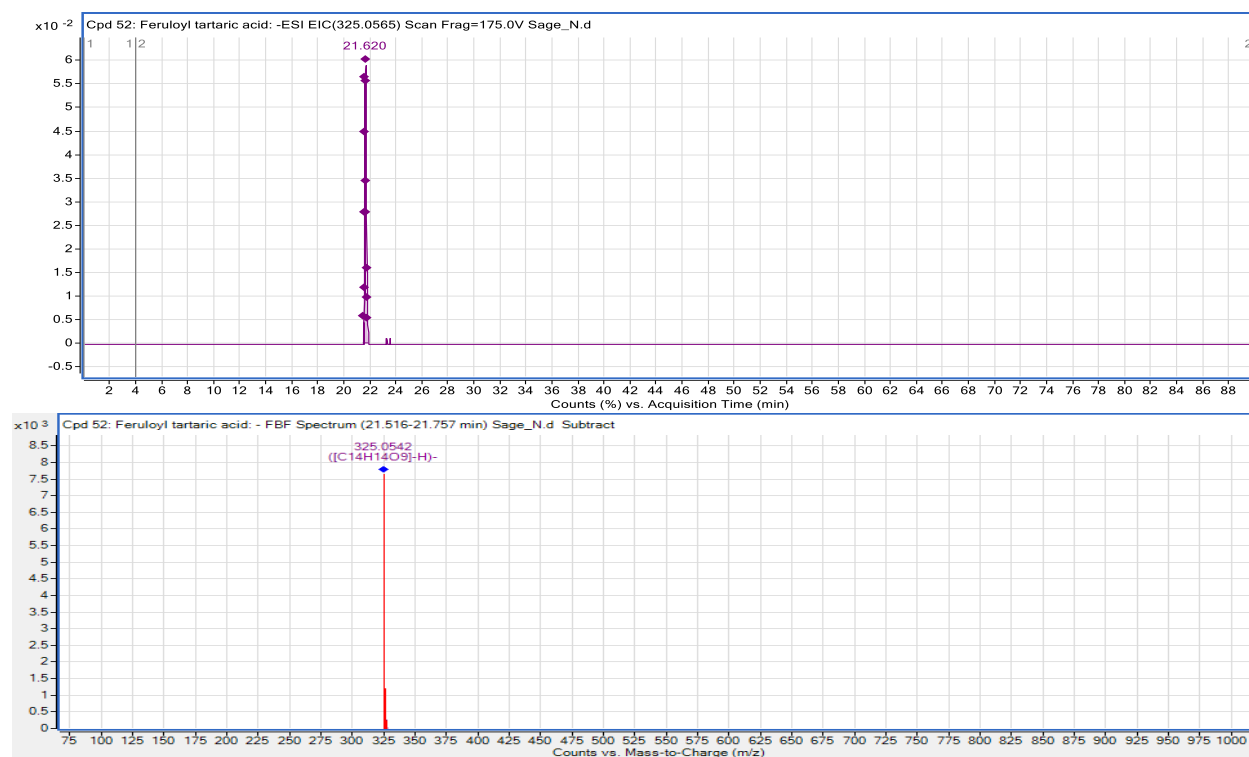
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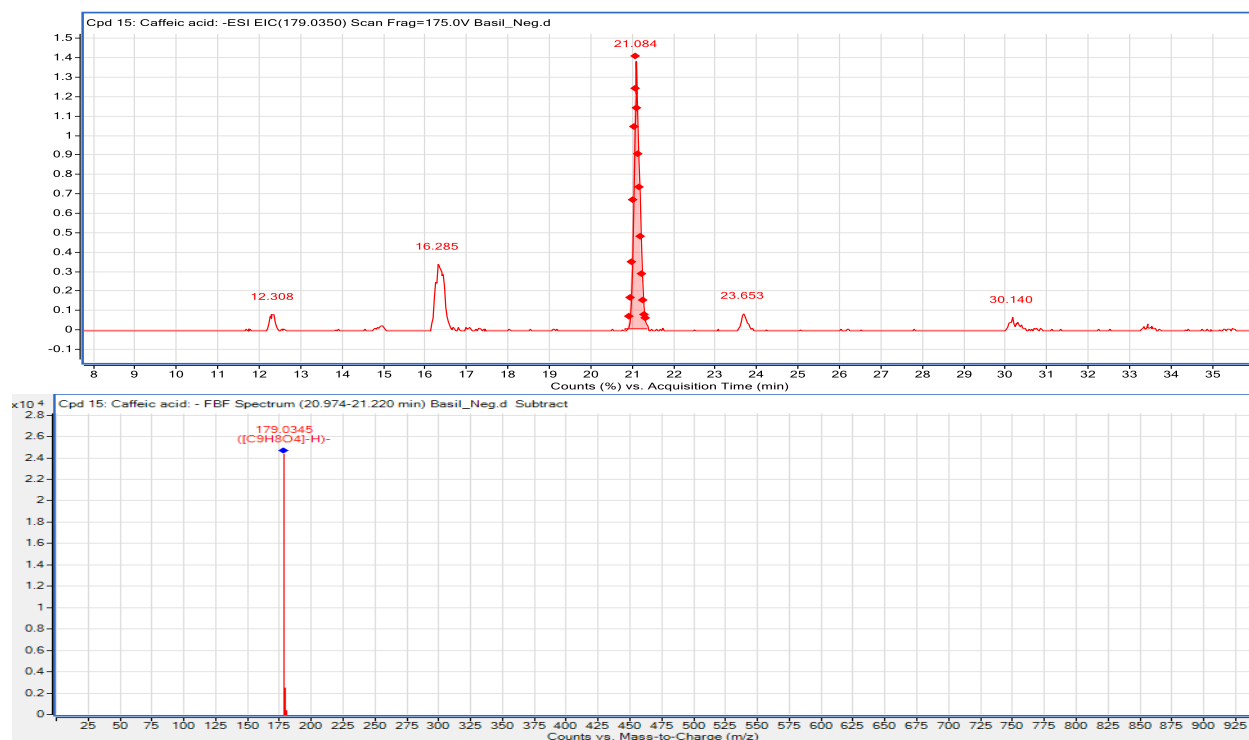
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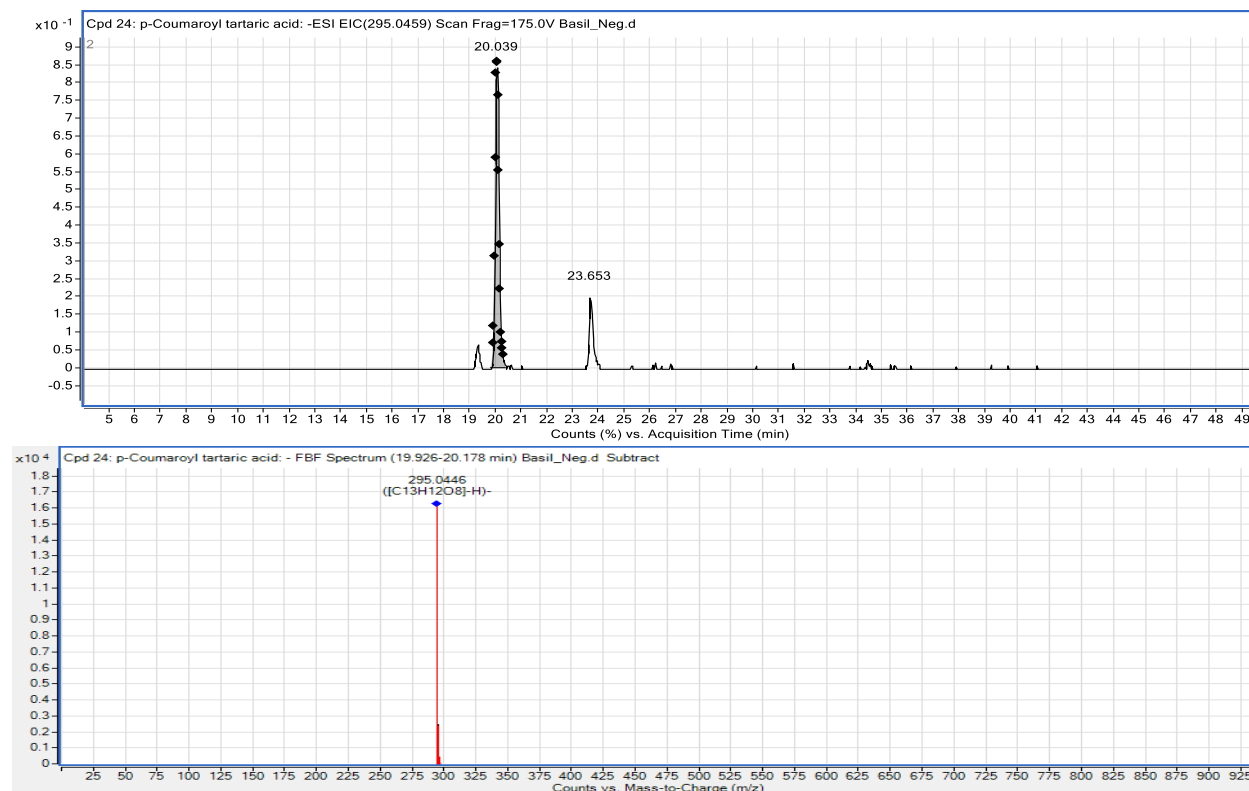
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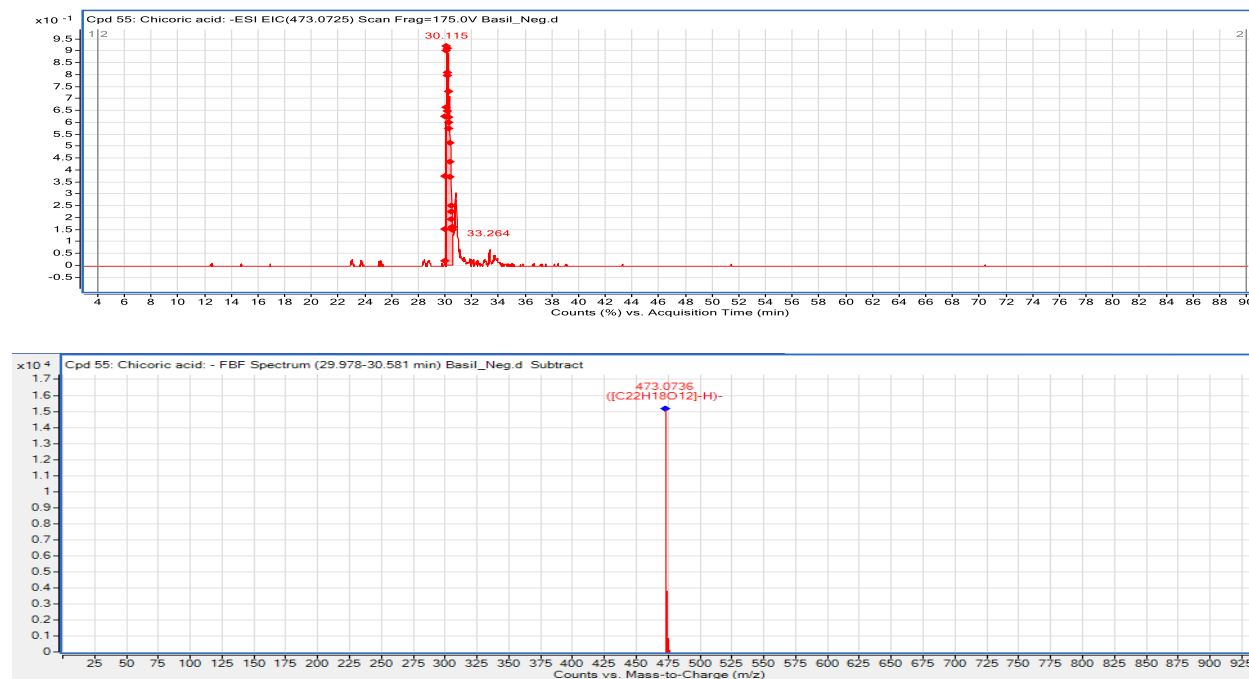
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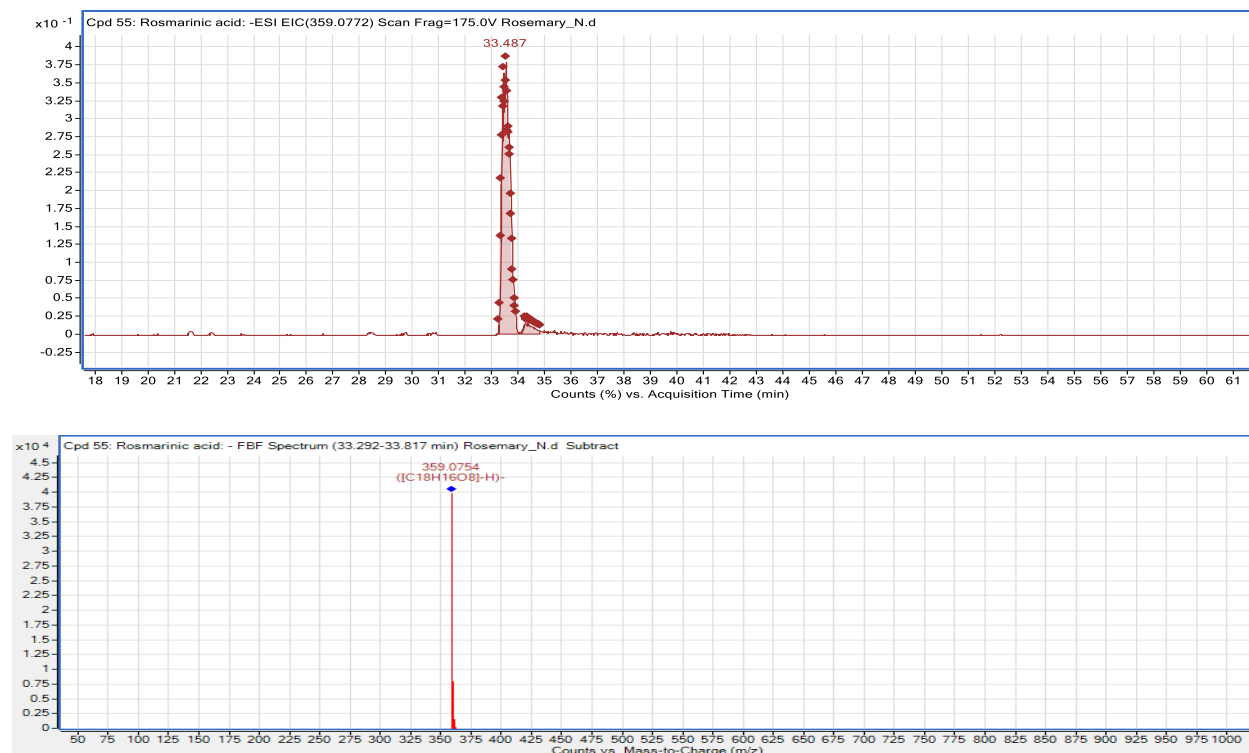
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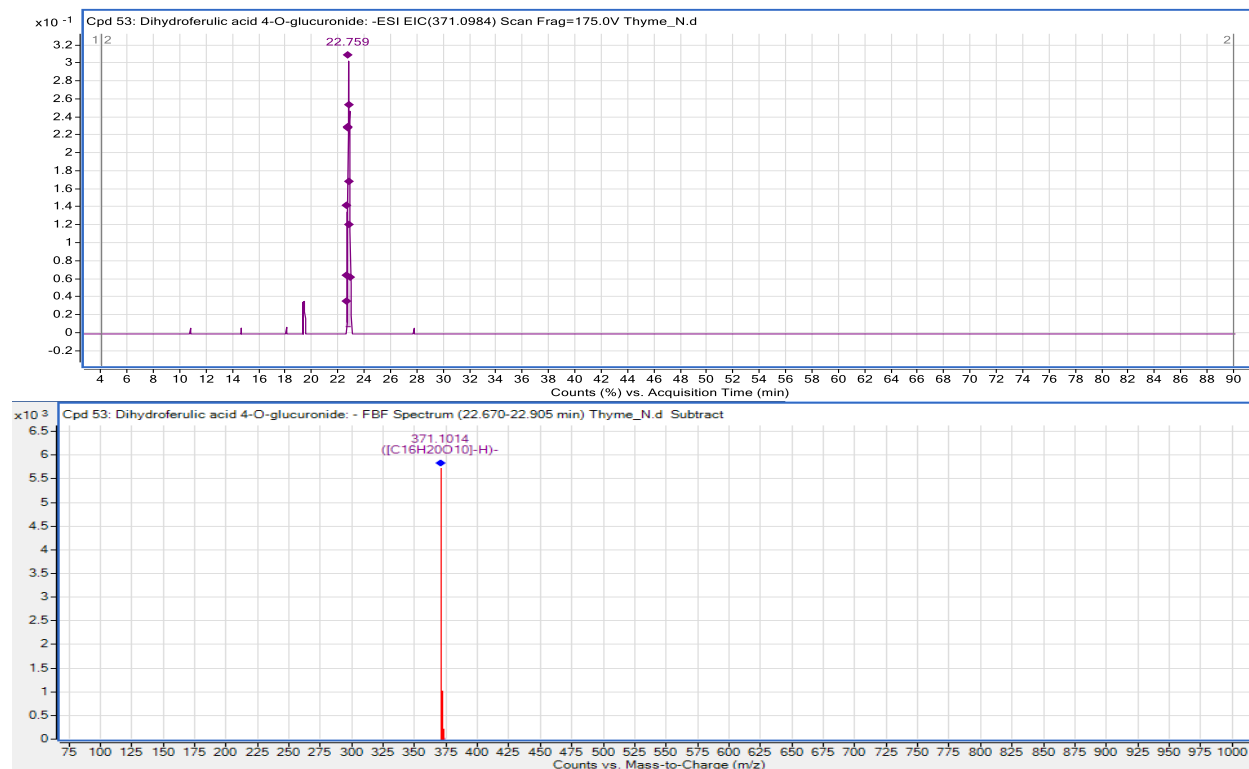
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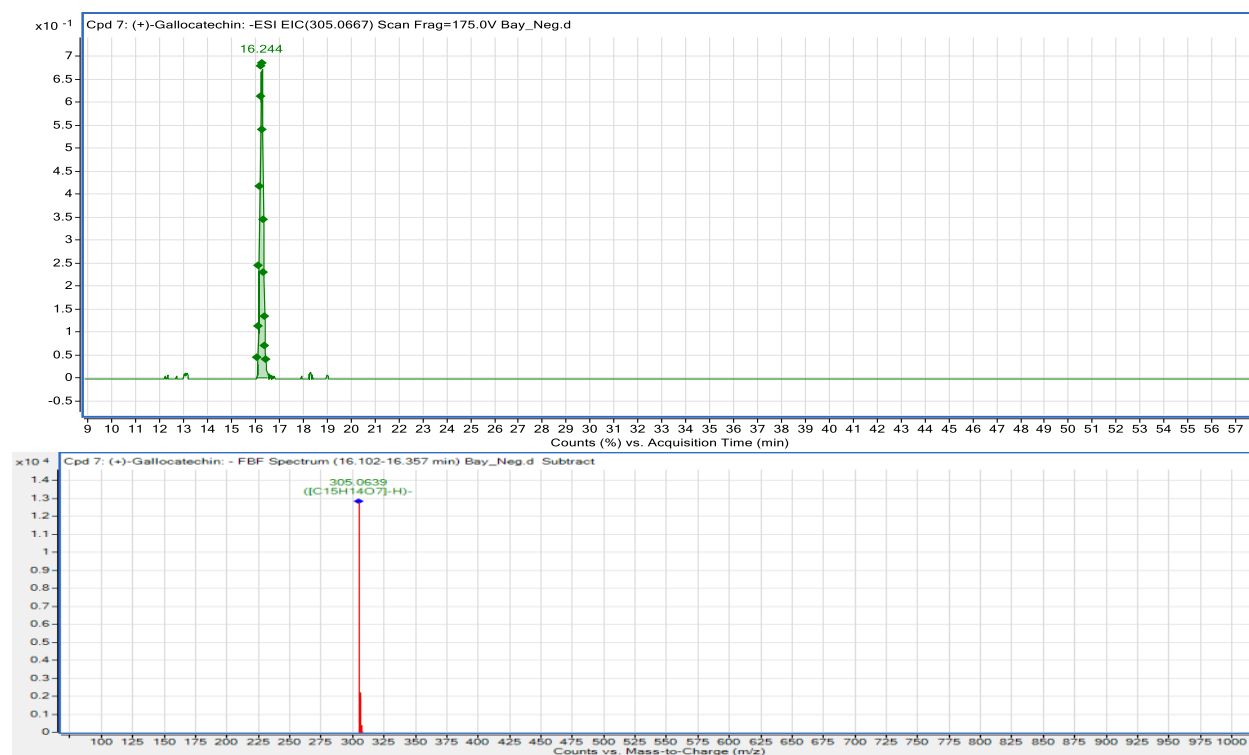
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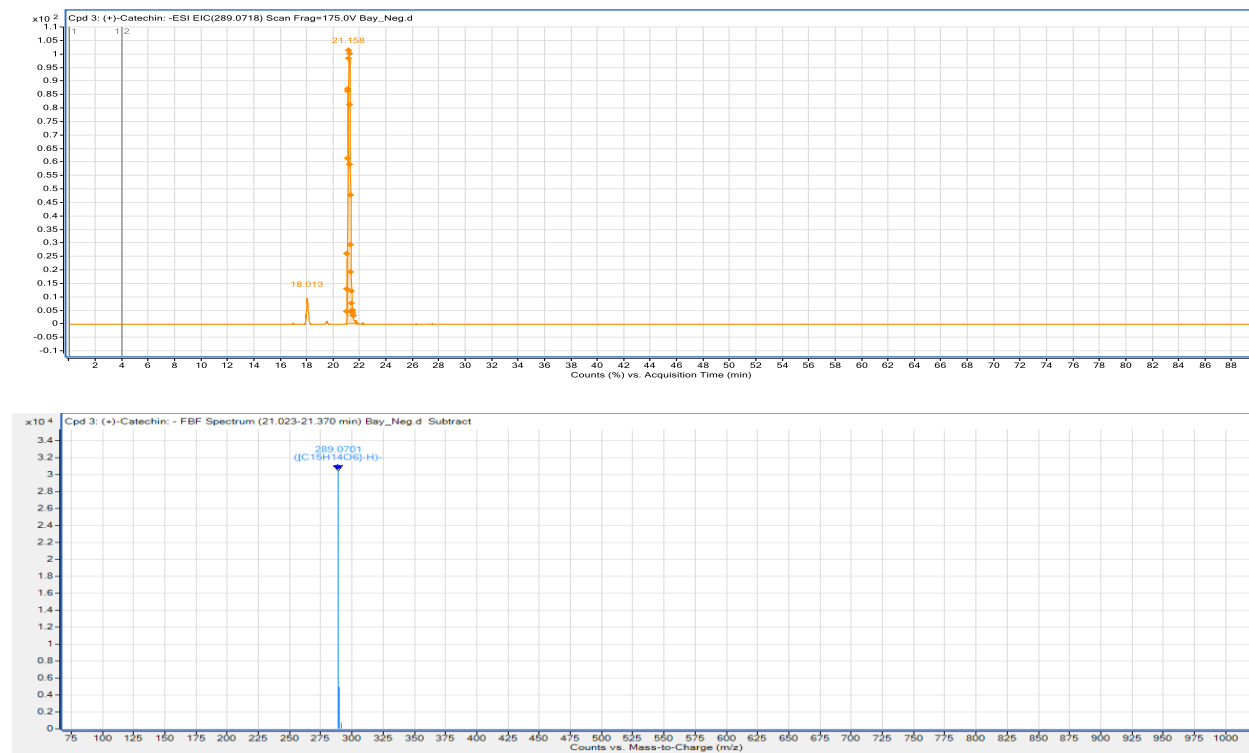
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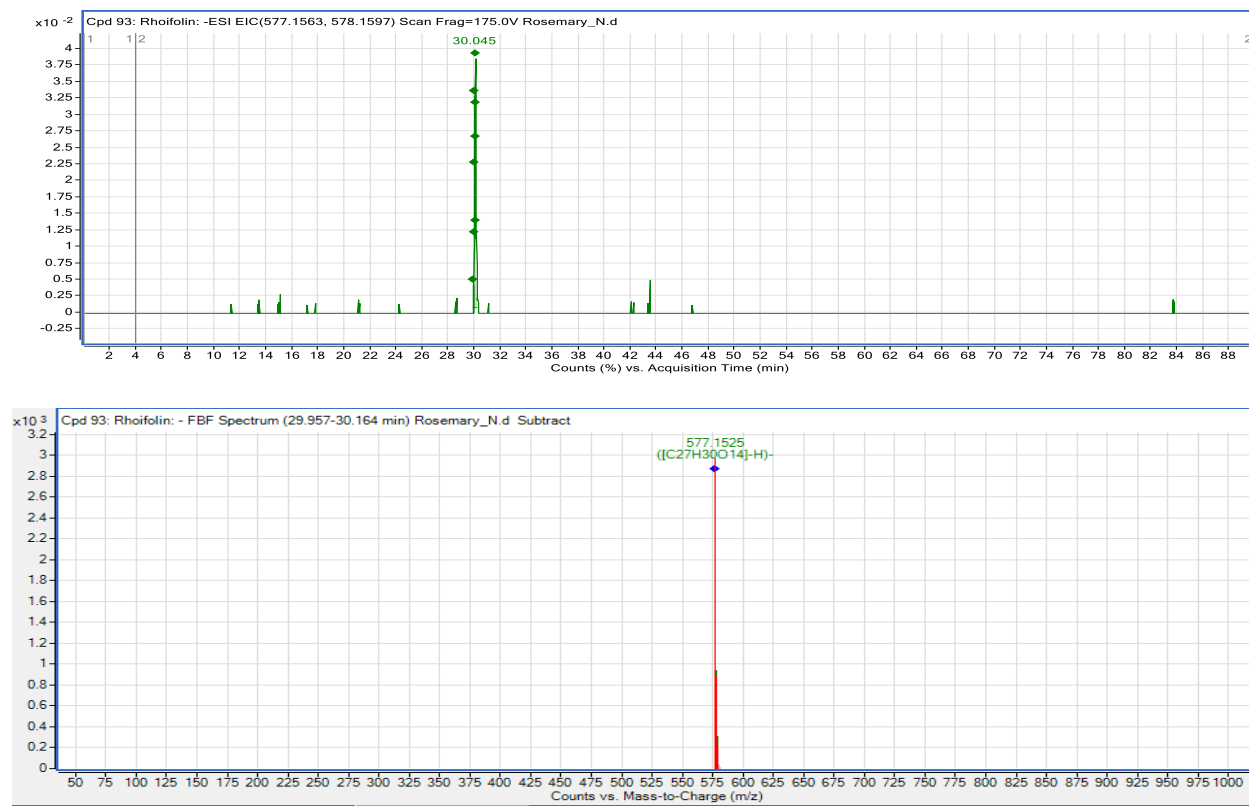
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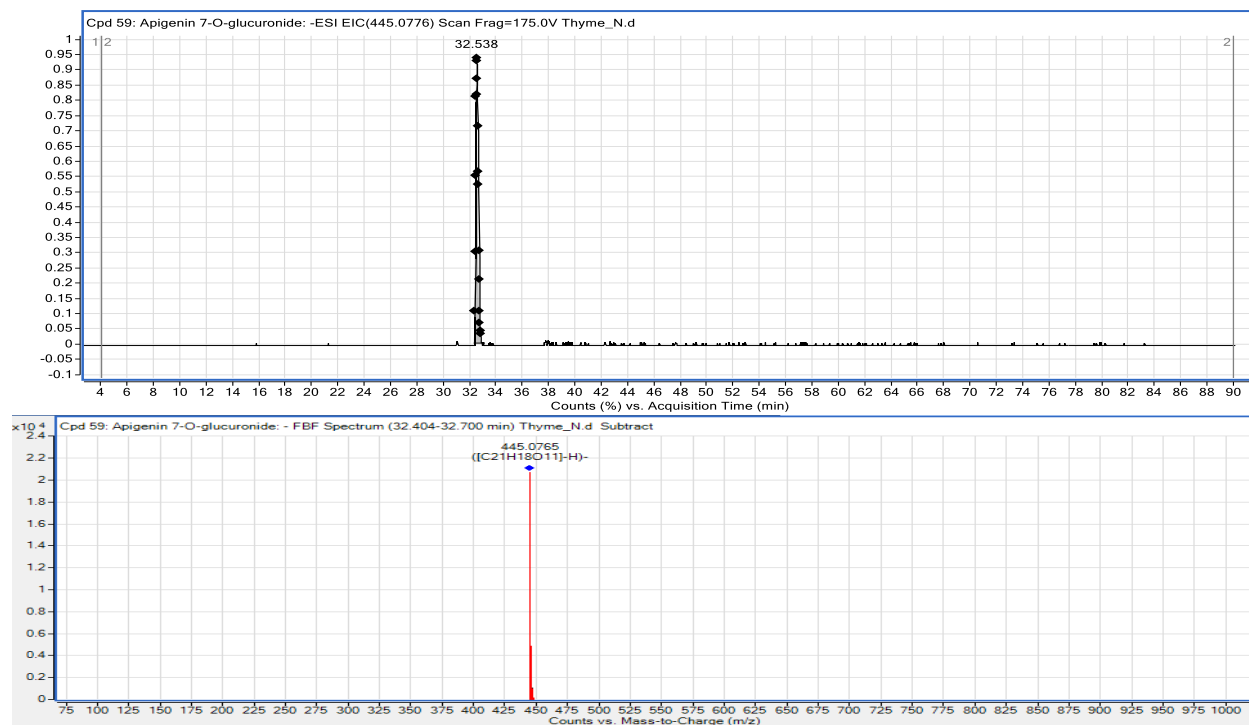
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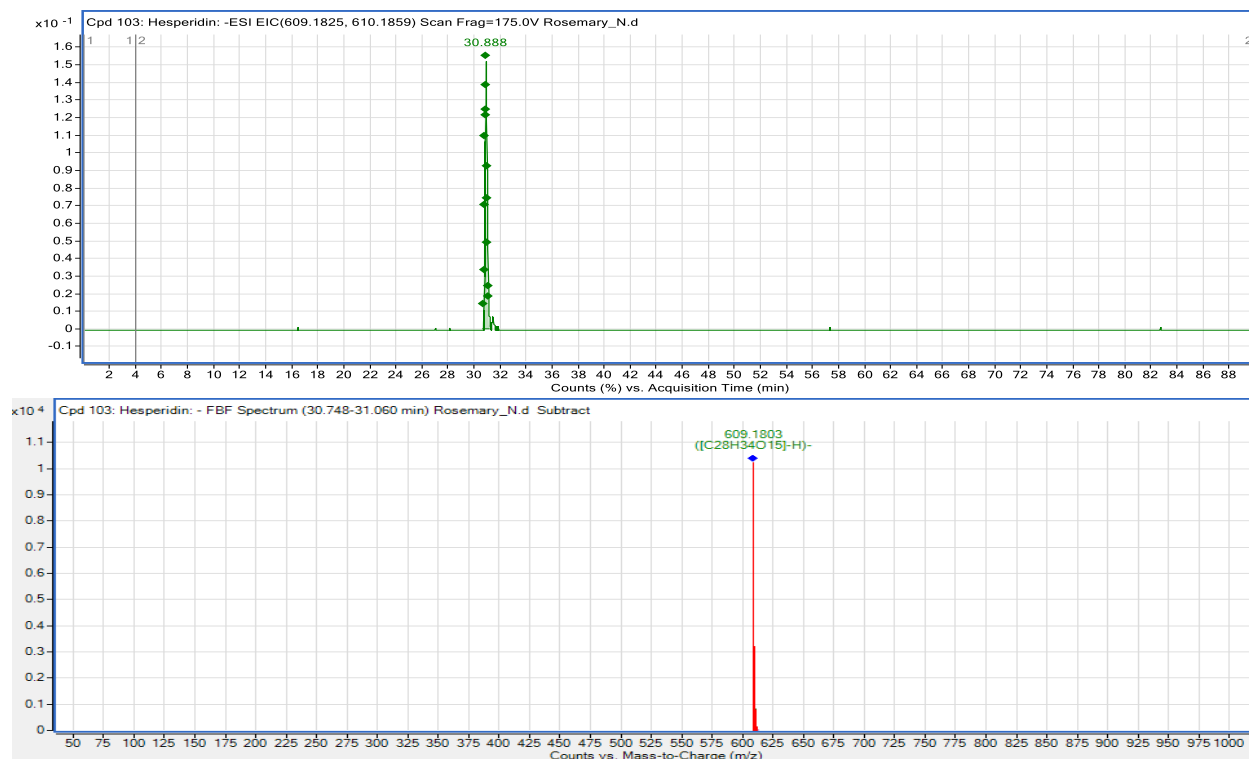
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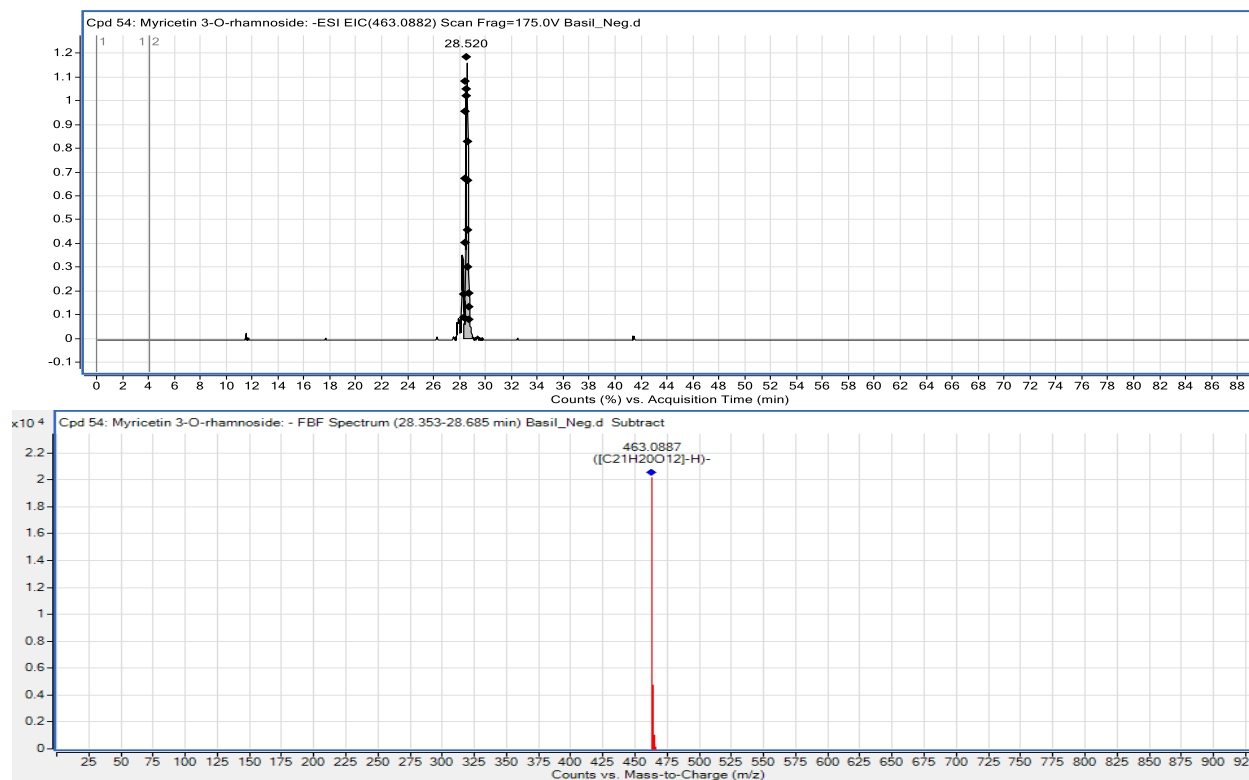
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Compound 43

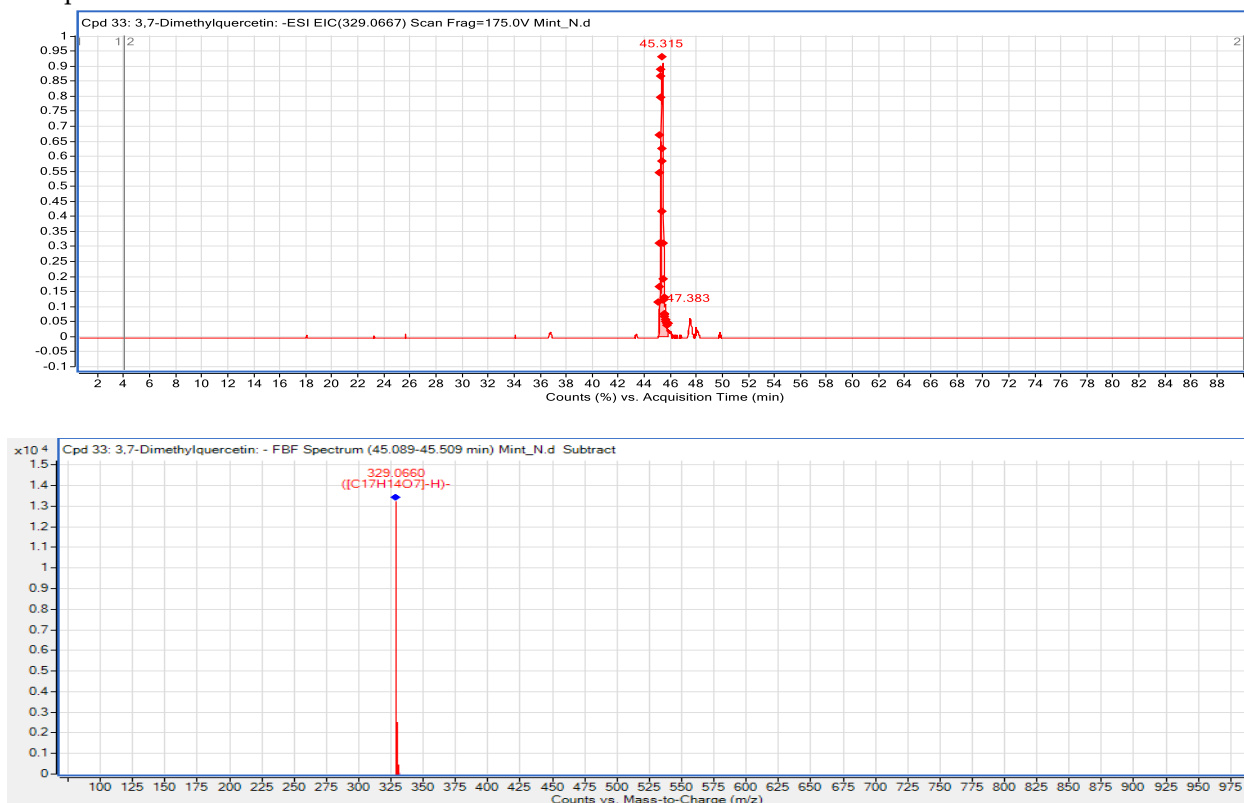


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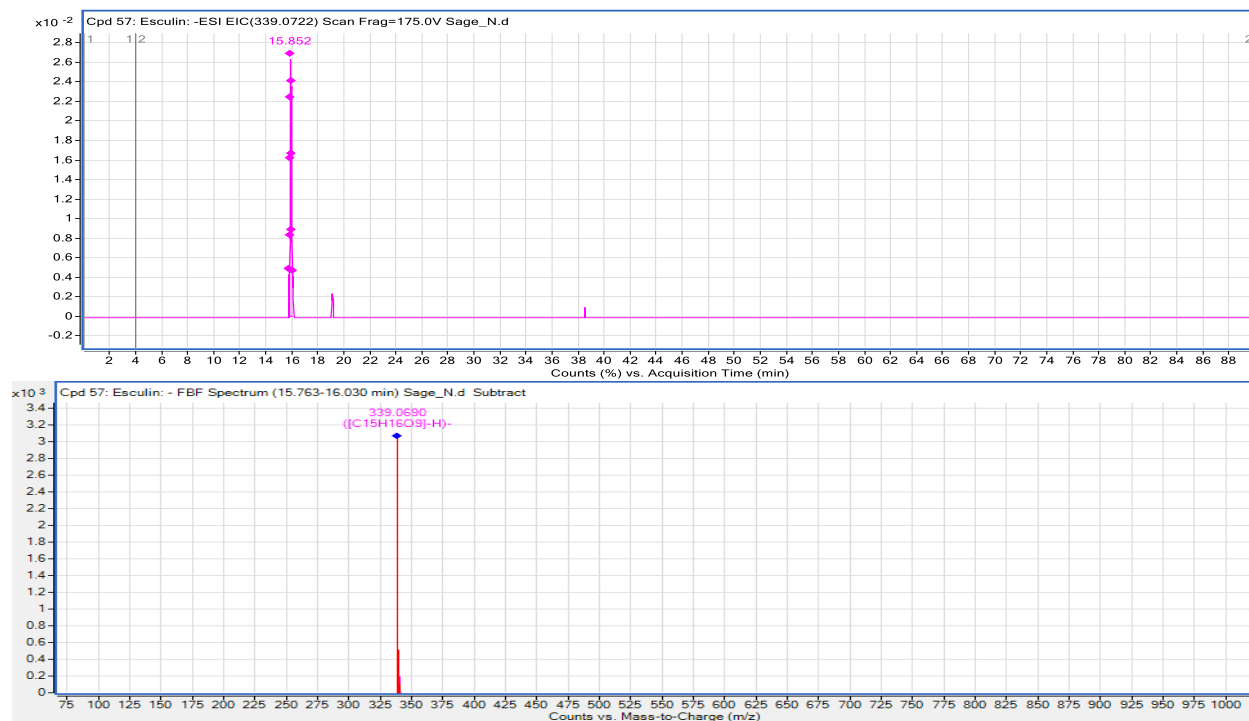


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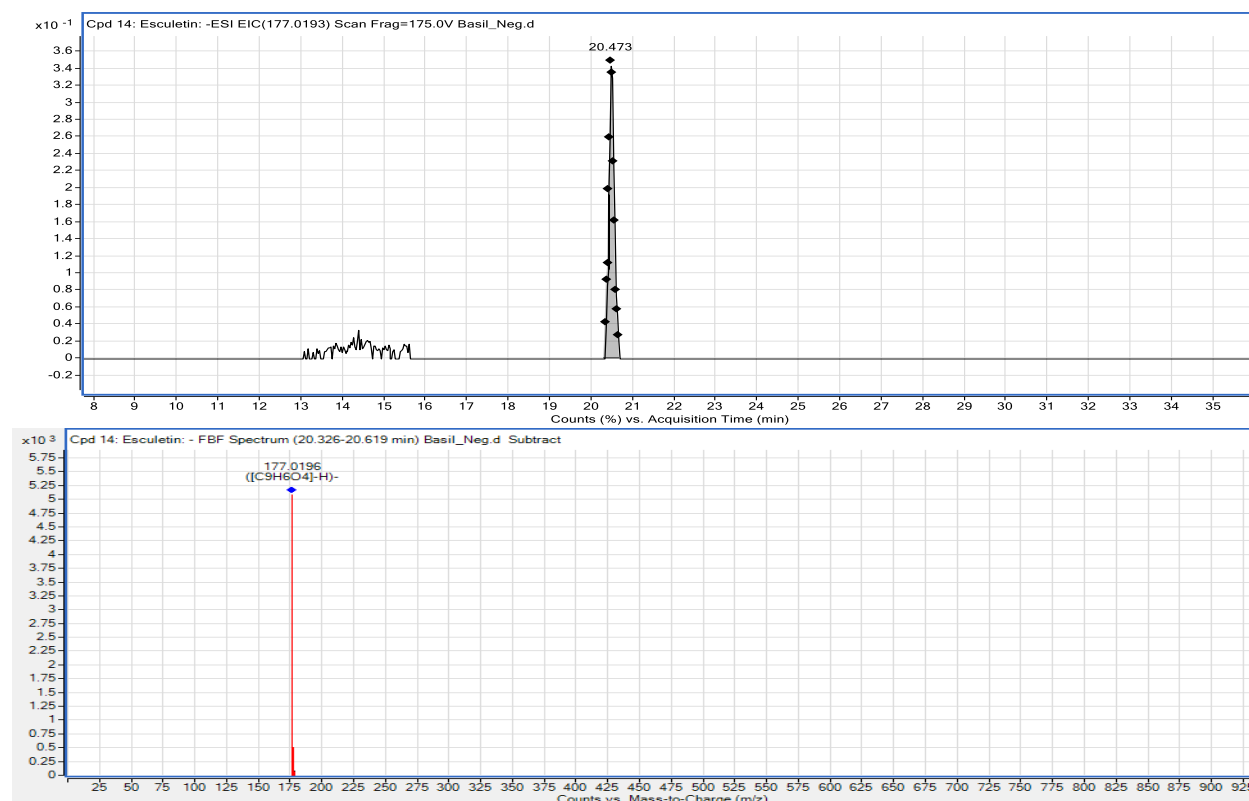
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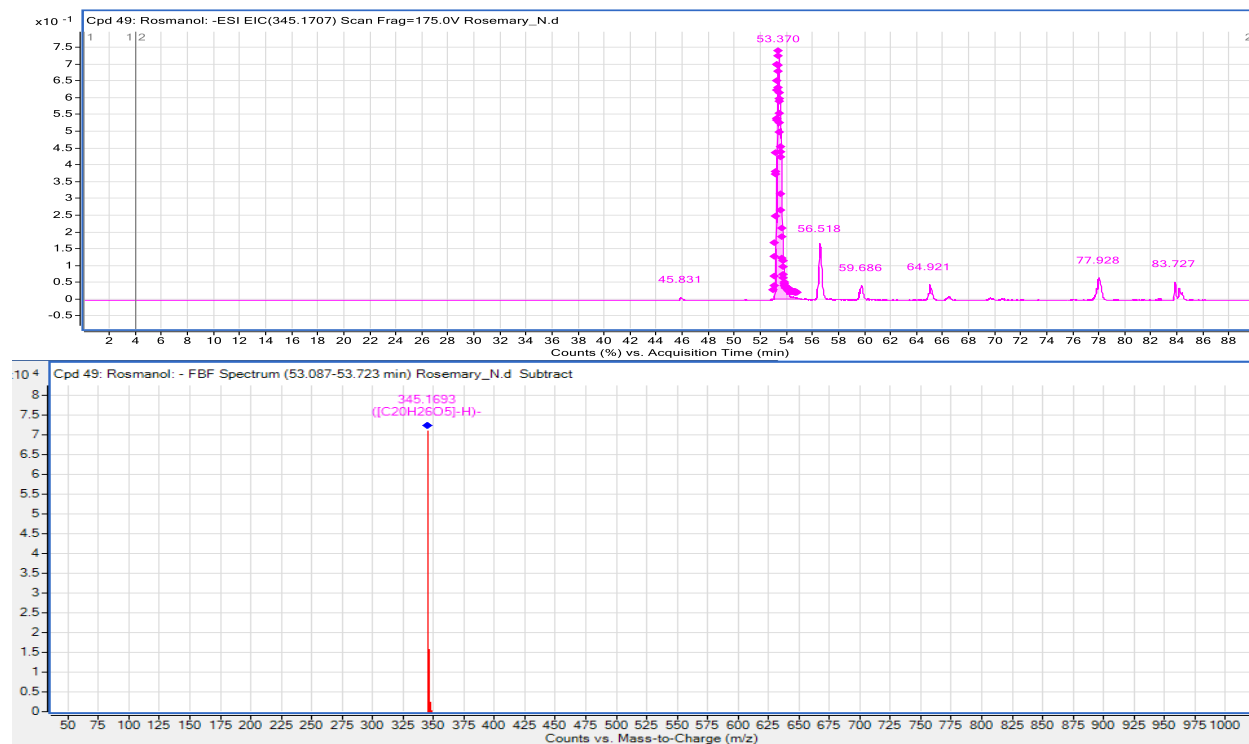
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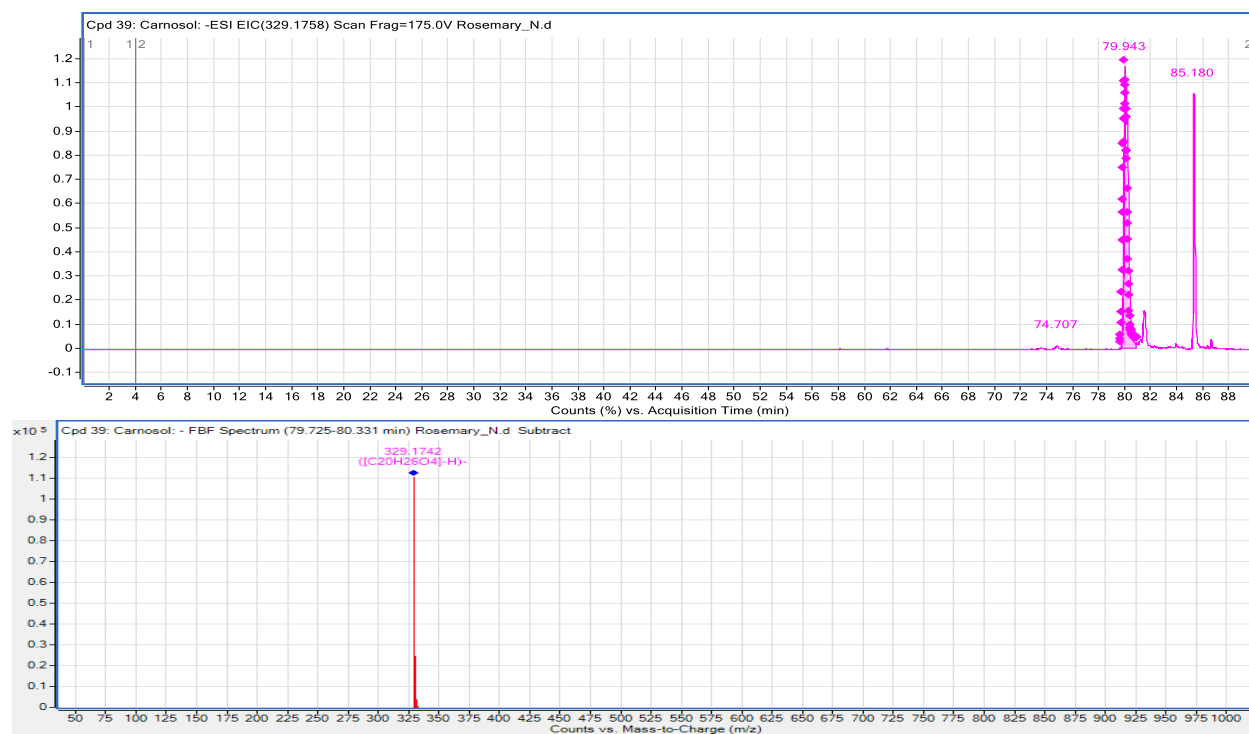
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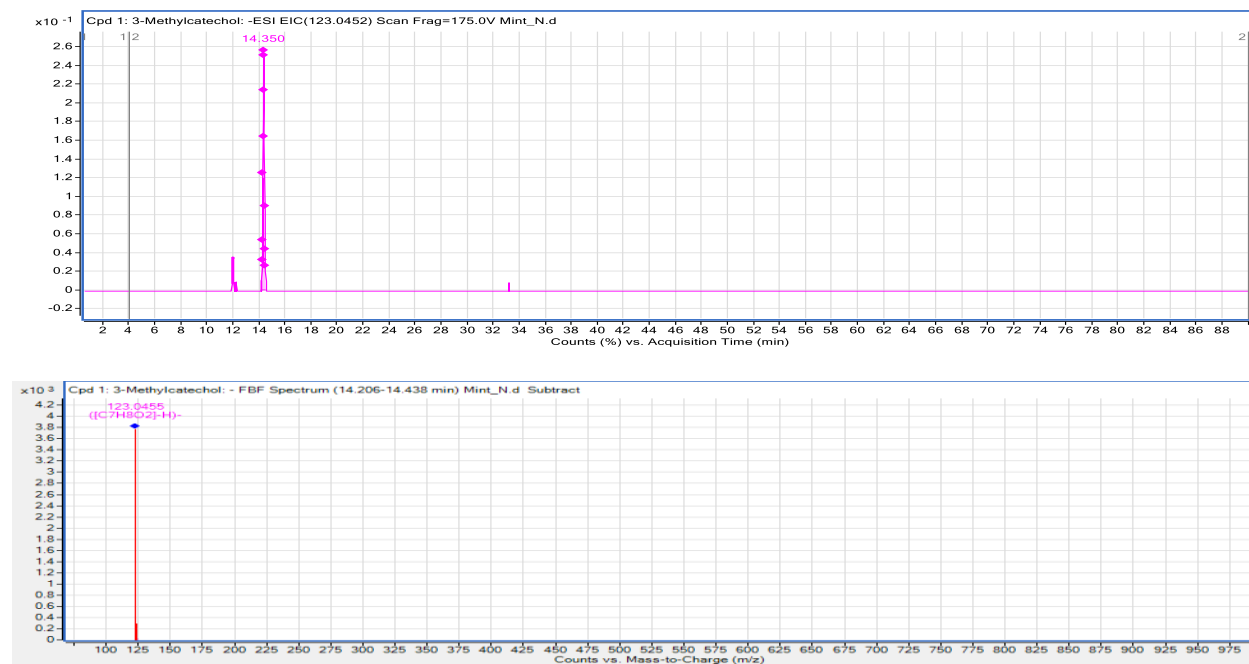
Compound 73



Compound 74



Compound 76



Compound 77

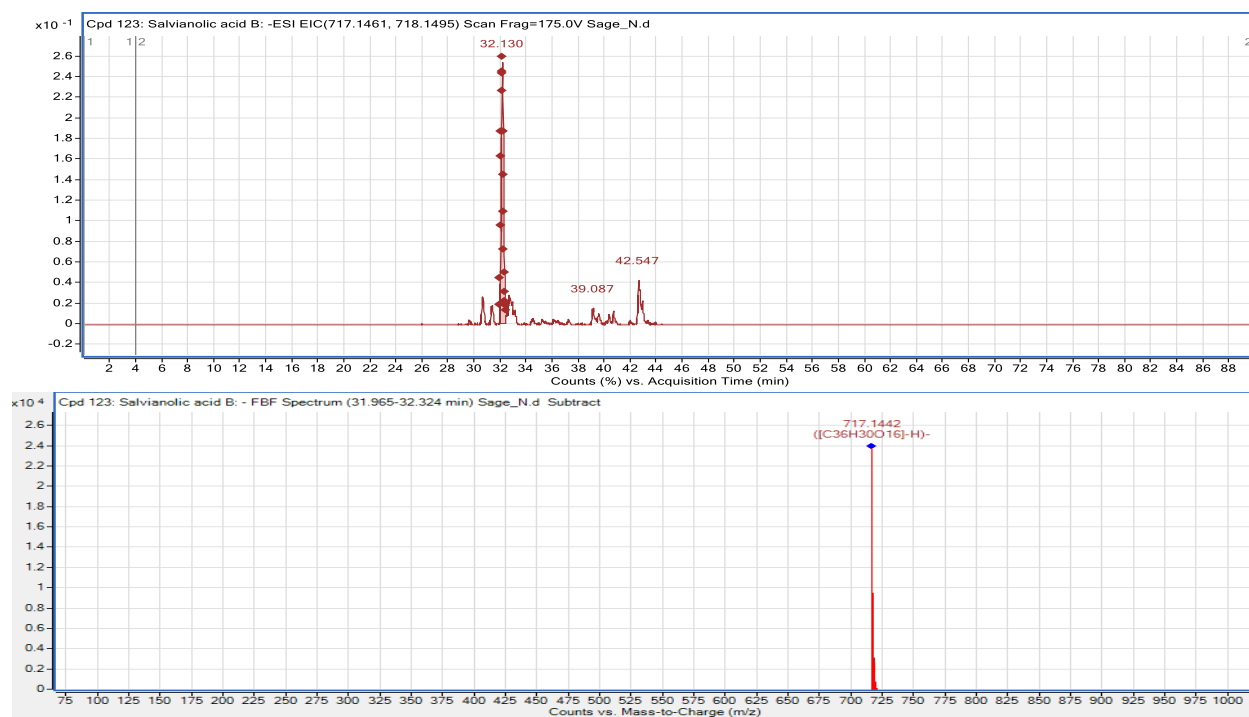


Figure S2: Chromatogram and spectrum of some selected compounds with their observed mass and retention time.

Table S1. HPLC-MS semi-quantification of abundant phenolic compounds in 10 herbs (µg/g)

Compounds	Oregano	Mint	Thyme	Basil	Rosemary	Bay	Sage	Fenugreek	Dill	Parsley
Gallic acid	57.02 ± 13.87	57.02 ± 11.31	59.59 ± 9.22	NQ	53.74 ± 7.92	56.63 ± 3.78	NQ	NQ	NQ	55.78 ± 6.54
Protocatechuic acid	331.45 ± 38.91	11.07 ± 0.99	NQ	273.79 ± 27.44	268.00 ± 18.11	NQ	269.83 ± 21.43	270.47 ± 24.61	282.58 ± 22.69	275.04 ±
Caftaric acid	NQ	NQ	81.89 ± 12.77	NQ	NQ	77.59 ± 9.56	NQ	79.42 ± 8.54	81.06 ± 12.49	NQ
<i>p</i> -hydroxybenzoic acid	162.12 ± 17.55	162.12 ± 23.44	75.95 ± 16.98	NQ	470.21 ± 39.32	NQ	NQ	NQ	NQ	NQ
Chlorogenic acid	122.20 ± 22.41	NQ	31.39 ± 12.89	117.51 ± 12.89	140.05 ± 23.56	106.00 ± 10.56	105.58 ± 12.54	109.56 ± 9.23	NQ	NQ
Caffeic acid	270.05 ± 19.18	NQ	32.12 ± 7.65	130.49 ± 11.54	129.26 ± 12.73	128.96 ± 15.24	129.29 ± 14.76	128.39 ± 11.54	NQ	NQ
Syringic acid	63.13 ± 11.08	163.13 ± 19.77	NQ	NQ	120.32 ±	77.39 ± 8.11	58.36 ± 8.12	58.12 ± 7.89	63.88 ± 7.65	59.70 ± 7.31
Epicatechin	116.69 ± 17.33	116.69 ± 12.44	14.15 ± 2.46	NQ	NQ	106.14 ± 9.36	NQ	110.74 ± 11.09	NQ	NQ
Coumaric acid	23.01 ± 0.91	NQ	NQ	NQ	340.44 ± 26.55	66.53 ± 5.67	58.62 ± 6.32	NQ	NQ	NQ
Ferulic acid	179.34 ± 33.01	NQ	NQ	NQ	124.13 ± 11.76	NQ	NQ	NQ	NQ	NQ
Sinapic acid	10.44 ± 0.89	NQ	NQ	30.11 ± 4.83	NQ	NQ	NQ	NQ	NQ	NQ
Rosmarinic acid	1650.13 ± 57.39	NQ	NQ	NQ	540.76 ± 27.31	NQ	NQ	NQ	NQ	NQ
Chicoric acid	71.57 ± 1.84	NQ	NQ	NQ	151.34 ± 11.43	NQ	NQ	NQ	NQ	NQ
Catechin	17.03 ± 1.01	13.17 ± 1.88	NQ	10.64 ± 1.83	NQ	14.58 ± 4.01	19.99 ± 2.11	24.60 ± 4.57	NQ	12.25 ± 3.61
Epicatechin gallate	NQ	NQ	36.67 ± 5.88	NQ	NQ	NQ	NQ	NQ	NQ	NQ
Quercetin-3-glucuronide	NQ	NQ	NQ	NQ	23.12 ± 2.89	14.86 ± 3.21	NQ	NQ	NQ	NQ
Quercetin-3-galactoside	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
Quercetin-3-glucoside	NQ	NQ	NQ	NQ	NQ	15.28 ± 3.03	14.65 ± 3.31	NQ	NQ	NQ
Kaempferol-3-glucoside	NQ	NQ	NQ	NQ	NQ	46.07 ± 4.31	NQ	NQ	NQ	NQ
Quercetin	93.44 ± 4.05	NQ	70.30 ± 10.43	NQ	170.95 ± 5.56	NQ	NQ	NQ	NQ	NQ
Luteolin 7- <i>O</i> -glucuronide	0.15 ±	NQ	NQ	NQ	2.13 ± 0.77	NQ	NQ	NQ	NQ	NQ
6-Hydroxyluteolin 7- <i>O</i> -rhamnoside	NQ	0.88 ± 0.02	NQ	NQ	1.07 ± 0.34	NQ	NQ	NQ	NQ	NQ
Myricetin 3- <i>O</i> -rhamnoside	NQ	NQ	NQ	0.55 ± 0.03	0.69 ± 0.47	NQ	NQ	NQ	NQ	NQ
Rosmanol	NQ	NQ	NQ	NQ	1.17 ± 0.23	NQ	NQ	NQ	NQ	NQ
Carnosol	NQ	NQ	NQ	NQ	0.11 ± 0.00	NQ	NQ	NQ	NQ	NQ
Carnosic acid	NQ	NQ	NQ	NQ	0.65 ± 0.01	NQ	NQ	NQ	NQ	NQ
Piceatannol	NQ	NQ	NQ	NQ	NQ	NQ	NQ	0.65 ± 0.08	NQ	NQ
Kaempferol	53.04 ± 7.11	NQ	25.04 ± 3.23	26.95 ± 2.48	81.55 ± 7.34	NQ	35.68 ± 4.67	NQ	NQ	NQ

*NQ = Not quantified