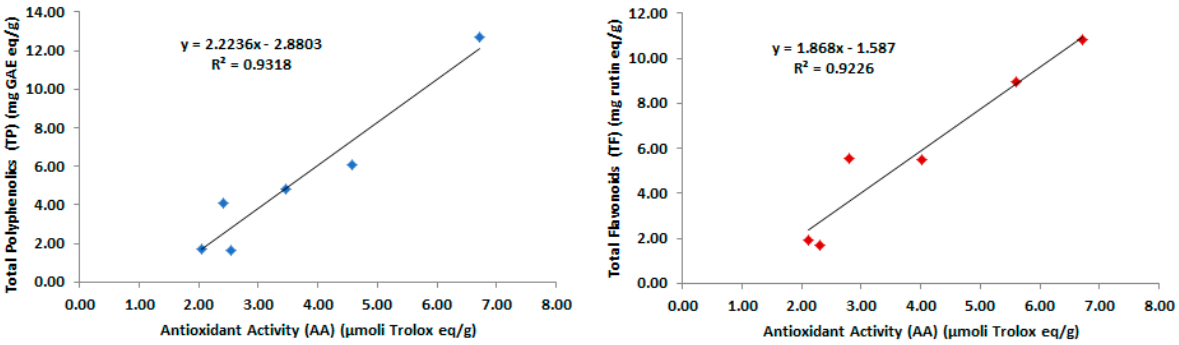
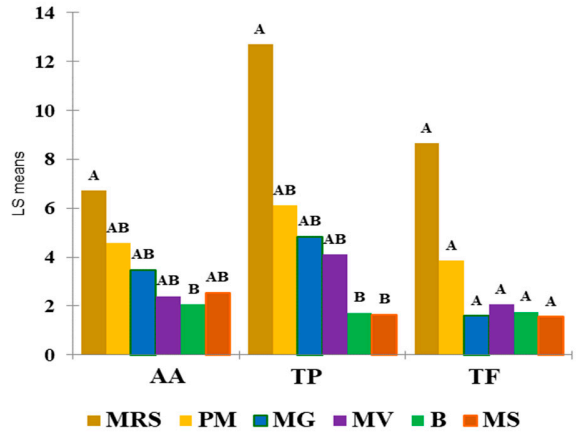
Supplementary material

1. Supplementary Figures



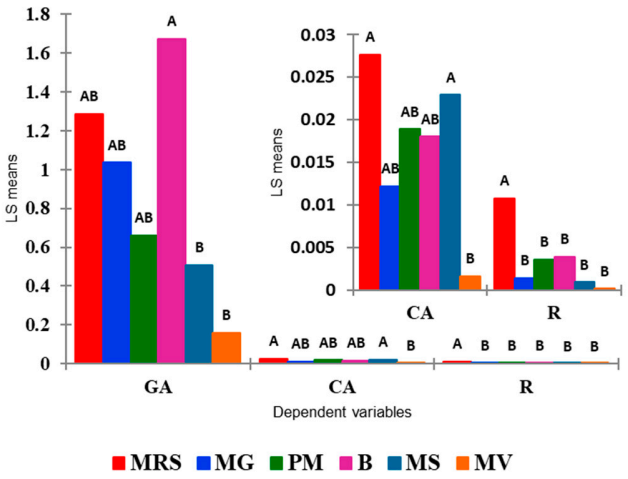
(a) **(b)**

Figure S1. Correlation between: (a) Total Polyphenolics with Antioxidant Activity and (b) Total Flavonoids with Antioxidant Activity



	AA	TP	TF
MRS	6.724	12.692	8.643
PM	4.567	6.107	3.859
MG	3.468	4.838	1.597
MV	2.409	4.101	2.061
B	2.054	1.729	1.761
MS	2.543	1.650	1.567
R^2	0.519	0.600	0.429
F	1.940	2.696	1.353
Pr > F	0.183	0.093	0.326
Significant	No	No	No

Figure S2. Variation of the Antioxidant Activity (AA), Total polyphenolics (TP) and Total Flavonoids (TF) in chestnut fruits of different sweet cultivars ('Précoce Migoule' - PM, 'Bournette' - B, 'Marsol' - MS, 'Marissard' - MRS, 'Marigoule' - MG and 'Maraval' – MV) harvested in 2015, 2016 and 2017. Different uppercase letters corresponding to the bars denote differences according to Duncan test $p \leq 0.05$.



	GA	CA	R
MRS	1.286	0.028	0.011
MG	1.035	0.012	0.001
PM	0.659	0.019	0.004
B	1.670	0.018	0.004
MS	0.508	0.023	0.001
MV	0.162	0.002	0.000
R^2	0.800	0.783	0.864
F	3.193	2.886	5.090
Pr > F	0.142	0.163	0.070
Significant	No	No	No

Figure S3. Variation of individual phenolic compounds (gallic acid – GA, cinnamic acid – CA and rutin – R) in chestnut fruits of different sweet cultivars ('Précoce Migoule' - PM, 'Bournette' - B, 'Marsol' - MS, 'Marissard' - MRS, 'Marigoule' - MG and 'Maraval' – MV) harvested in 2016 and 2017. Different uppercase letters corresponding to the bars denote differences according to Duncan test $p \leq 0.05$.

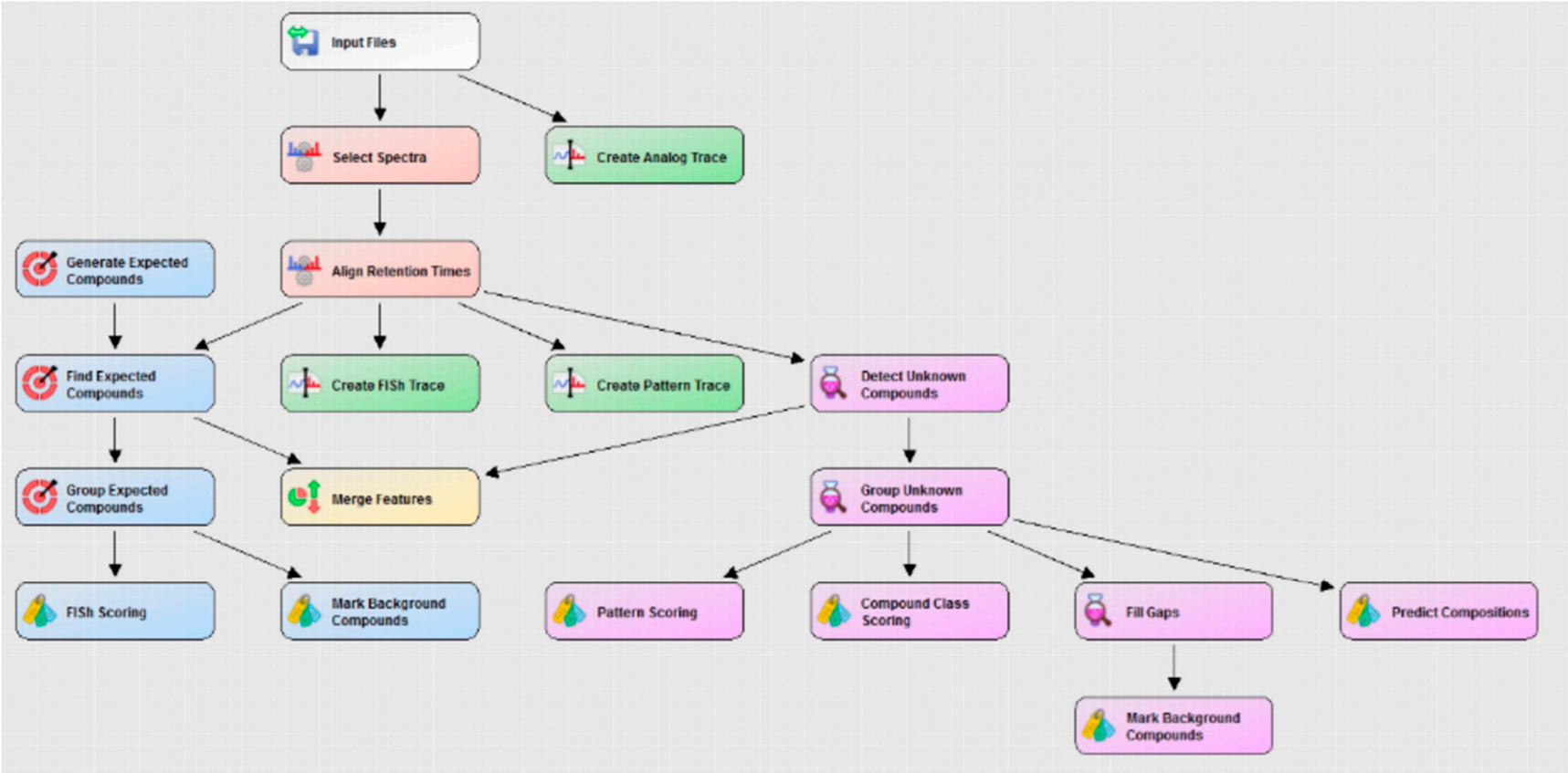


Figure S4. Untargeted Metabolomics workflow: Find and identify the differences between samples.

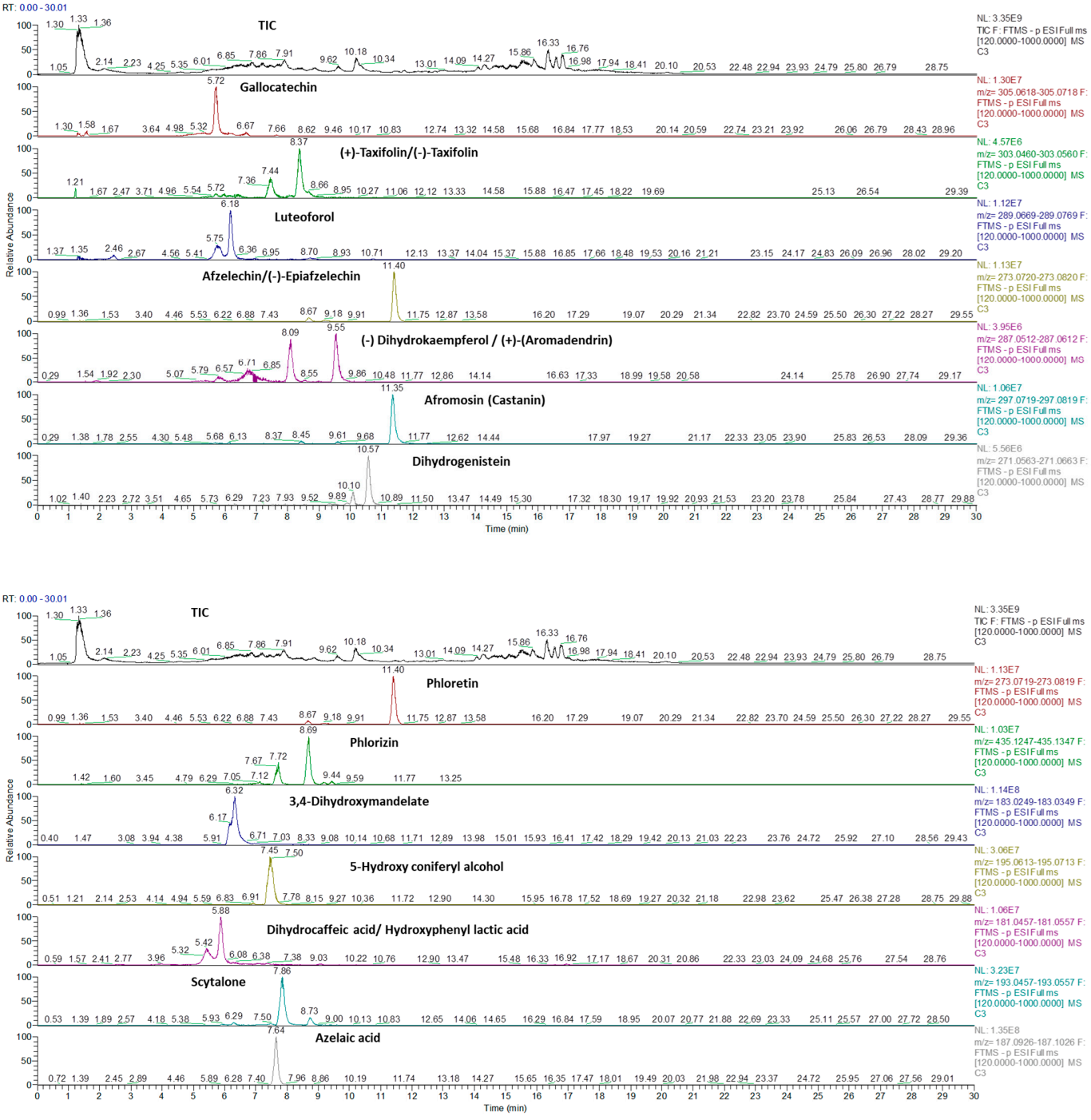
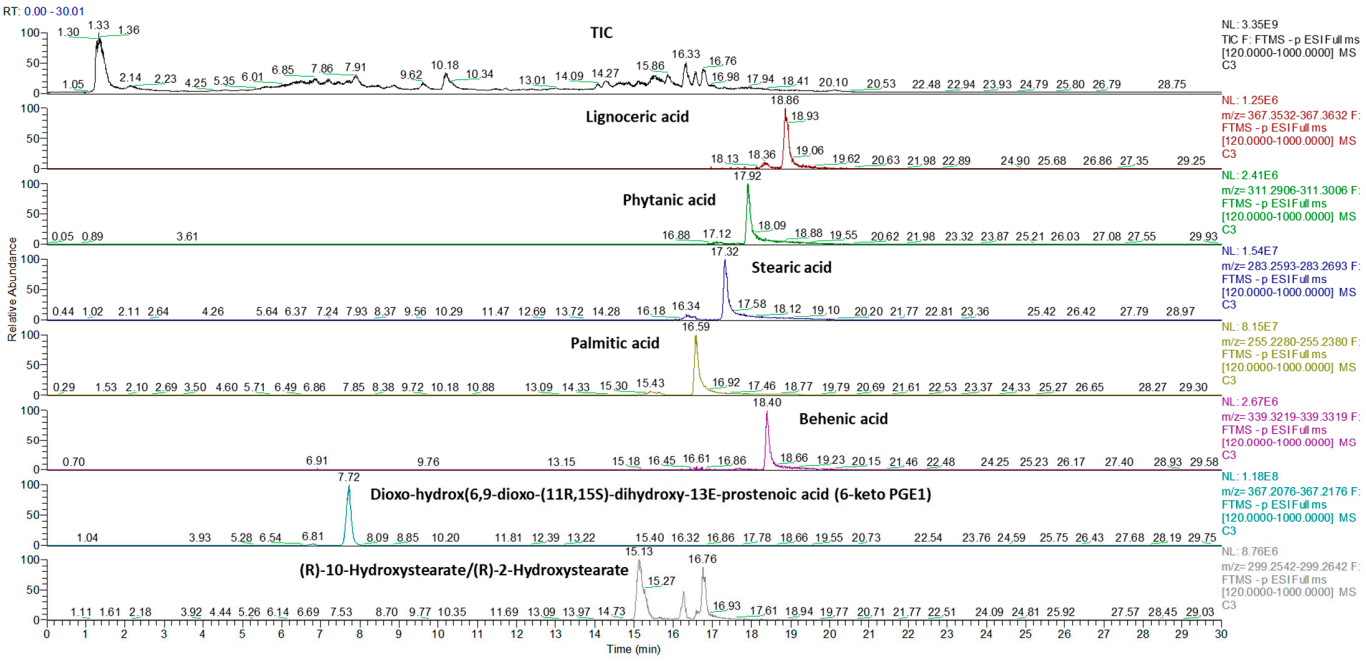
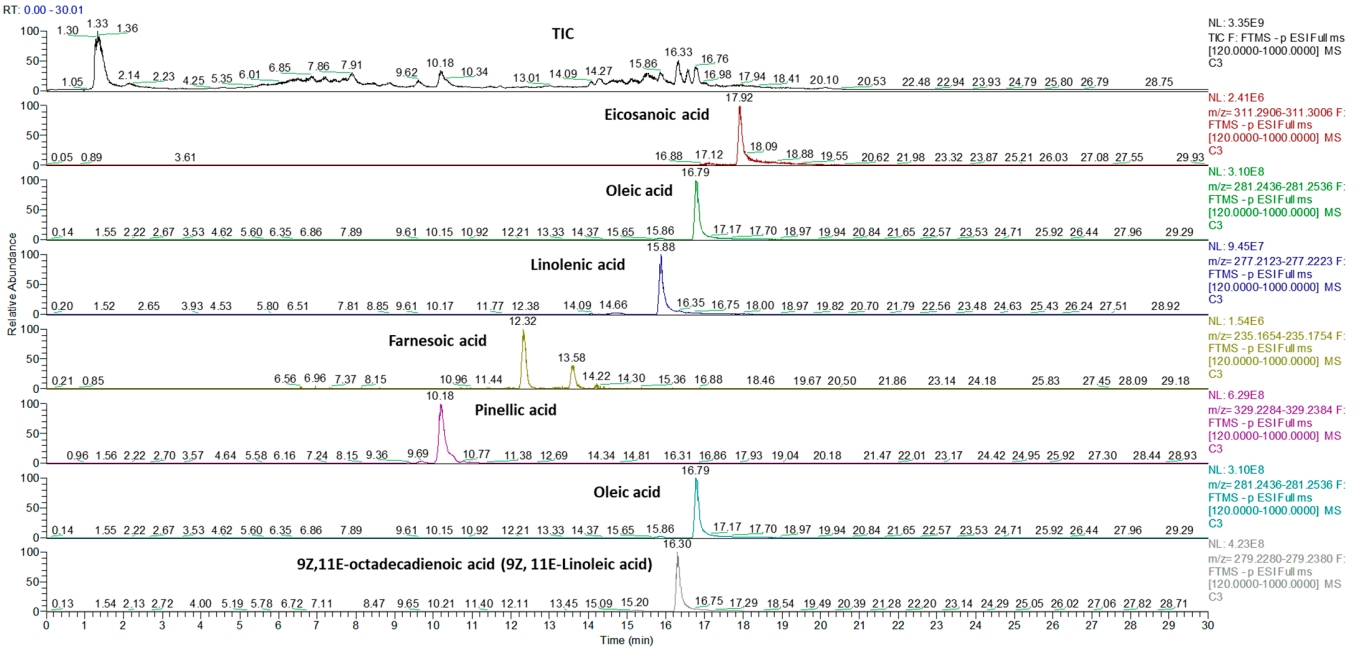


Figure S5. TIC and the extracted chromatograms of the main phytochemical compounds identified in chestnut methanolic extract (the chromatograms were extracted from TIC using a 5 ppm mass accuracy window; negative ion mode, full scan, base peak in the range 75-1000 m/z)



(a)



(b)

Figure S6. TIC and the extracted chromatograms of the main saturated (a) and unsaturated (b) fatty acids identified in chestnut methanolic extract (the chromatograms were extracted from TIC using a 5 ppm mass accuracy window; negative ion mode, full scan, base peak in the range 75-1000 m/z)

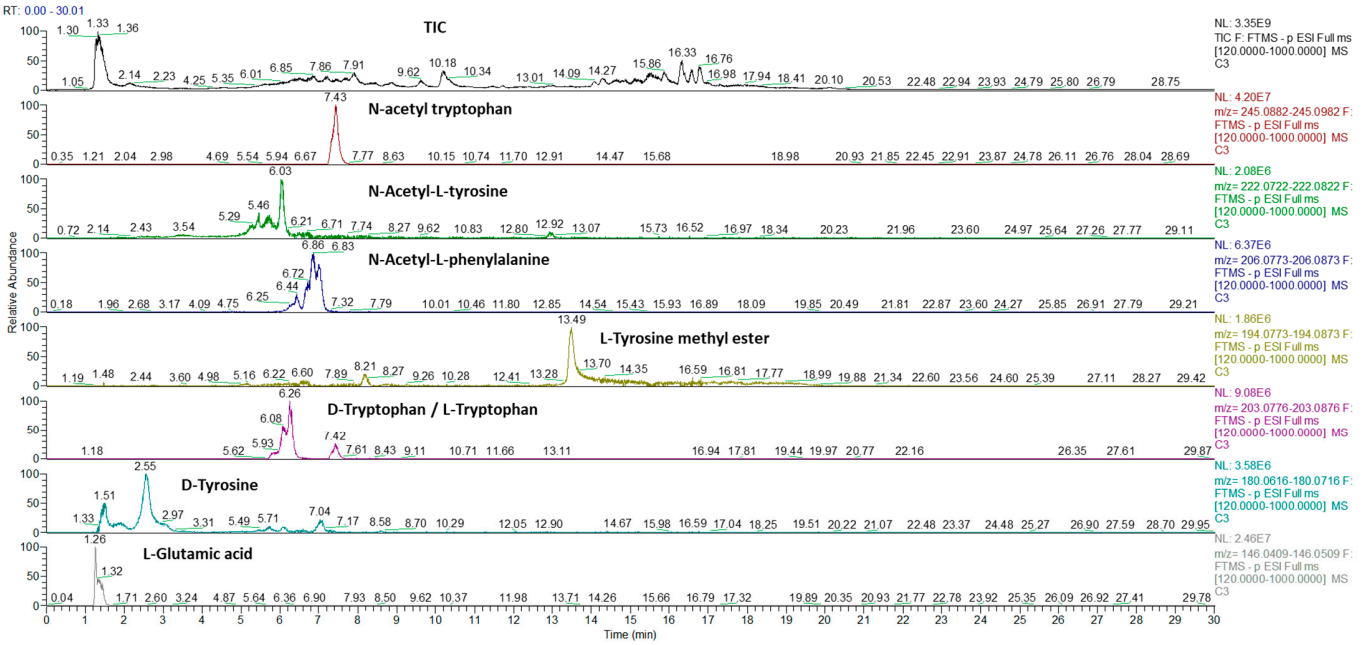


Figure S7. TIC and the extracted chromatograms of the main amino acids identified in chestnut methanolic extract (the chromatograms were extracted from TIC using a 5 ppm mass accuracy window; negative ion mode, full scan, base peak in the range 75-1000 m/z)

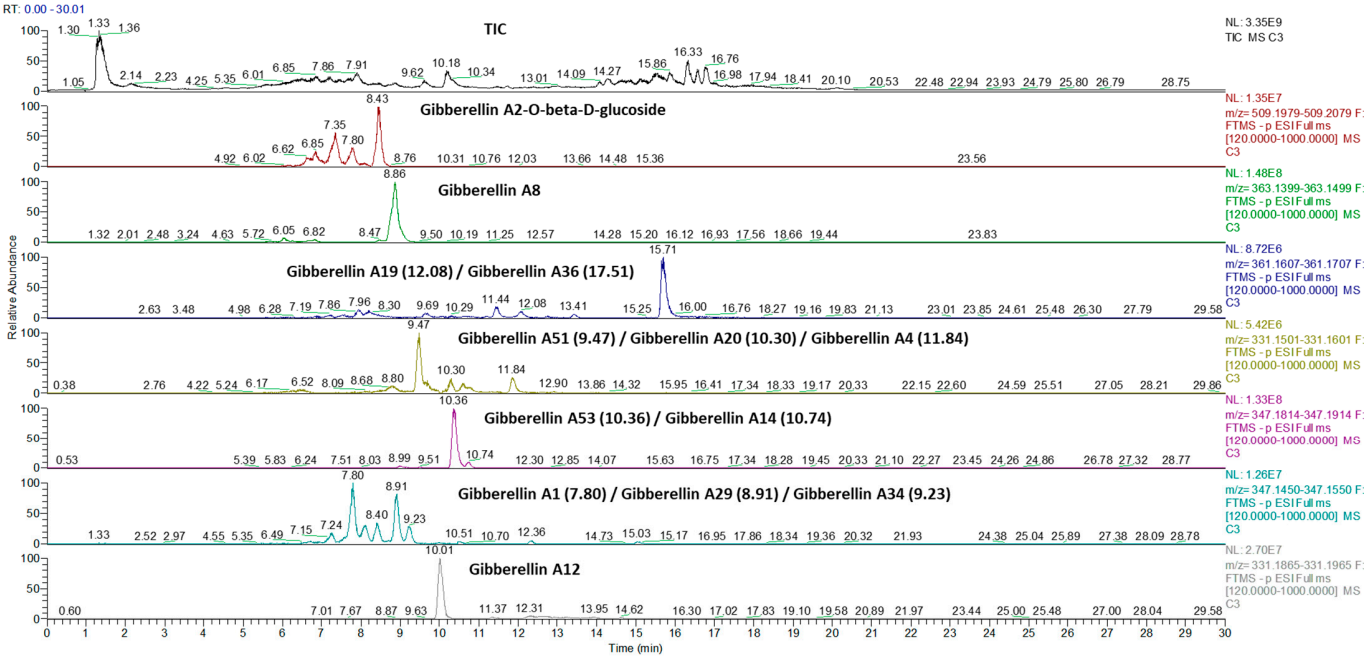


Figure S8. TIC and the extracted chromatograms of the main gibberellin plant hormones identified in chestnut methanolic extract (the chromatograms were extracted from TIC using a 5 ppm mass accuracy window; negative ion mode, full scan, base peak in the range 75-1000 m/z)

2. Supplementary Tables

Table S1. Sums of Growing Degree Hours and Growing Degree Days for the sweet chestnut cultivars

Cultivar		**Σ of Growing Degree Hours (GDH)**				**Σ of Growing Degree Days (GDD, °D)**			
		2015	2016	2017	*Mean*	2015	2016	2017	*Mean*
'Précoce Migoule'	Start of harvesting	60100	61811	60486	*60799*	2212	2141	2172	*2175*
	End of harvesting	61755	62388	61352	*61832*	2281	2165	2208	*2218*
'Bournette'	Start of harvesting	60421	61980	61168	*61190*	2226	2148	2200	*2191*
	End of harvesting	61578	63629	61794	*62334*	2274	2217	2226	*2239*
'Marsol'	Start of harvesting	61054	61980	60977	*61337*	2252	2148	2192	*2197*
	End of harvesting	62032	63175	61587	*62265*	2293	2198	2218	*2236*
'Marissard'	Start of harvesting	61348	62165	61352	*61622*	2264	2156	2208	*2209*
	End of harvesting	62388	63710	62062	*62720*	2308	2221	2237	*2255*
'Marigoule'	Start of harvesting	62567	63844	62395	*62935*	2315	2226	2251	*2264*
	End of harvesting	63617	64045	62850	*63504*	2359	2235	2270	*2288*
'Maraval'	Start of harvesting	62951	63767	62454	*63057*	2331	2223	2254	*2269*
	End of harvesting	63741	64265	63005	*63670*	2364	2244	2277	*2295*

Table S2. Quality performance data for the phenolic acids and flavonoids profiling by UHPLC-MS/MS in negative ionization mode

No.	Compound	Retention time [min]	Accurate mass $[M-H]^-$	Mass fragments	Calibration curve		Performance characteristics		
					Linearity	R^2	LOD (μg/g)	LOQ (μg/g)	Recovery (%)
Phenolic acids									
1	Gallic acid	4.57	169.0133	125.0231	0-10 mg/L	0.9956	0.12	0.4	85
2	3,4-Dihydroxybenzoic	5.46	153.0183	109.0281	0-7.5 mg/L	0.9949	0.36	1.2	84
3	4-Hydroxybenzoic acid	6.37	137.0232	93.0331	0-10 mg/L	0.9914	1.08	3.6	82
4	Chlorogenic acid	6.52	353.0879	191.0553	0-7.5 mg/L	0.9639	0.12	0.4	80
5	Syringic acid	6.89	197.0450	182.0212, 166.9976, 153.0547, 138.0311, 123.0075	0-7.5 mg/L	0.9850	0.36	1.2	86
6	Caffeic acid	6.68	179.0338	135.044	0-10 mg/L	0.9995	0.12	0.4	89
8	*p*-Coumaric acid	7.27	163.0392	119.0489	0-7.5 mg/L	0.9730	0.36	1.2	93
9	*t*-Ferulic acid	7.86	193.0500	178.0262, 134.0361	0-7.5 mg/L	0.9879	0.6	2.0	88
10	Ellagic acid	8.28	300.9990	300.9990	0-10 mg/L	0.9837	1.2	4.0	98
11	Cinnamic acid	8.50	147.0441	119.0489, 103.0387	0-10 mg/L	0.9996	0.48	1.6	84
Catechins									
13	(+)-Catechin	6.18	289.0719	109.0282, 125.0232, 137.0232, 151.0390, 203.0708, 245.0817	0-10 mg/L	0.9919	0.36	1.2	95
14	(-)-Epicatechin	6.55			0-7.5 mg/L	0.9840	0.12	0.4	86
Flavonols									
15	Quercetin	10.02	301.0356	151.0226, 178.9977, 121.0282, 107.0125	0-10 mg/L	0.9912	0.48	1.6	92
16	Myricetin	8.81	317.0305	178.9977, 151.0025	0-10 mg/L	0.9980	0.36	1.2	101
17	Naringin	7.77	579.1718	363.0721	0-7.5 mg/L	0.9997	0.24	0.8	95
18	Hesperidin	7.99	609.1824	377.0876	0-7.5 mg/L	0.9781	0.6	2.0	84
19	Rutin	7.81	609.1462	3345.0614	0-7.5 mg/L	0.9720	0.36	1.2	99
20	Kaempferol	11.15	285.0406	151.0389, 117.0180	0-7.5 mg/L	0.9537	0.72	2.4	82
21	Isorhamnetin	11.51	315.0512	300.0276	0-7.5 mg/L	0.9582	0.24	0.8	90
22	Apigenin	11.81	269.0457	117.0333, 151.0027, 107.0126	0-7.5 mg/L	0.9927	0.36	1.2	87

23	Pinocembrin	12.02	255.0663	213.0551, 151.0026, 107.0125	0-10 mg/L	0.9866	0.6	2.0	96
24	Chrysin	12.93	253.0506	143.0491, 145.0284, 107.0125, 209.0603, 63.0226,	0-7.5 mg/L	0.9731	0.48	1.6	100
25	Galangin	12.58	269.0458	169.0650, 143.0491	0-7.5 mg/L	0.9595	0.72	2.4	96
26	Pinostrobin	14.35	269.081	179.0554	0-10 mg/L	0.9947	0.72	2.4	95
Stilbens									
27	*t*-Resveratrol	8.25	227.0707	185.0813, 143.0337	0-7.5 mg/L	0.9959	0.48	1.6	91

Table S3. Climatic conditions (temperature and precipitation) in the main European chestnut producing countries and Romania during 2017, 2016 and 2017 harvest year according to https://climateknowledgeportal.worldbank.org/

	2015		2016		2017		Average	
	T_{mean} °C	Precipitation mm	T_{mean} °C	Precipitation mm	T_{mean} °C	Precipitation mm	T_{mean} °C	Precipitation mm
Italy	13.52	776.87	13.34	847.76	13.19	749.33	13.35	791.32
Spain	14.48	472.9	14.34	628.21	14.59	453.6	14.47	518.24
Portugal	16.07	547.74	15.94	926.14	16.33	559.91	16.11	677.93
Turkey	11.76	624.88	12.15	619.92	11.92	513.42	11.94	586.07
Romania	10.79	615.54	10.38	738.28	10.36	653.63	10.51	669.15