**Supplementary Materials:**

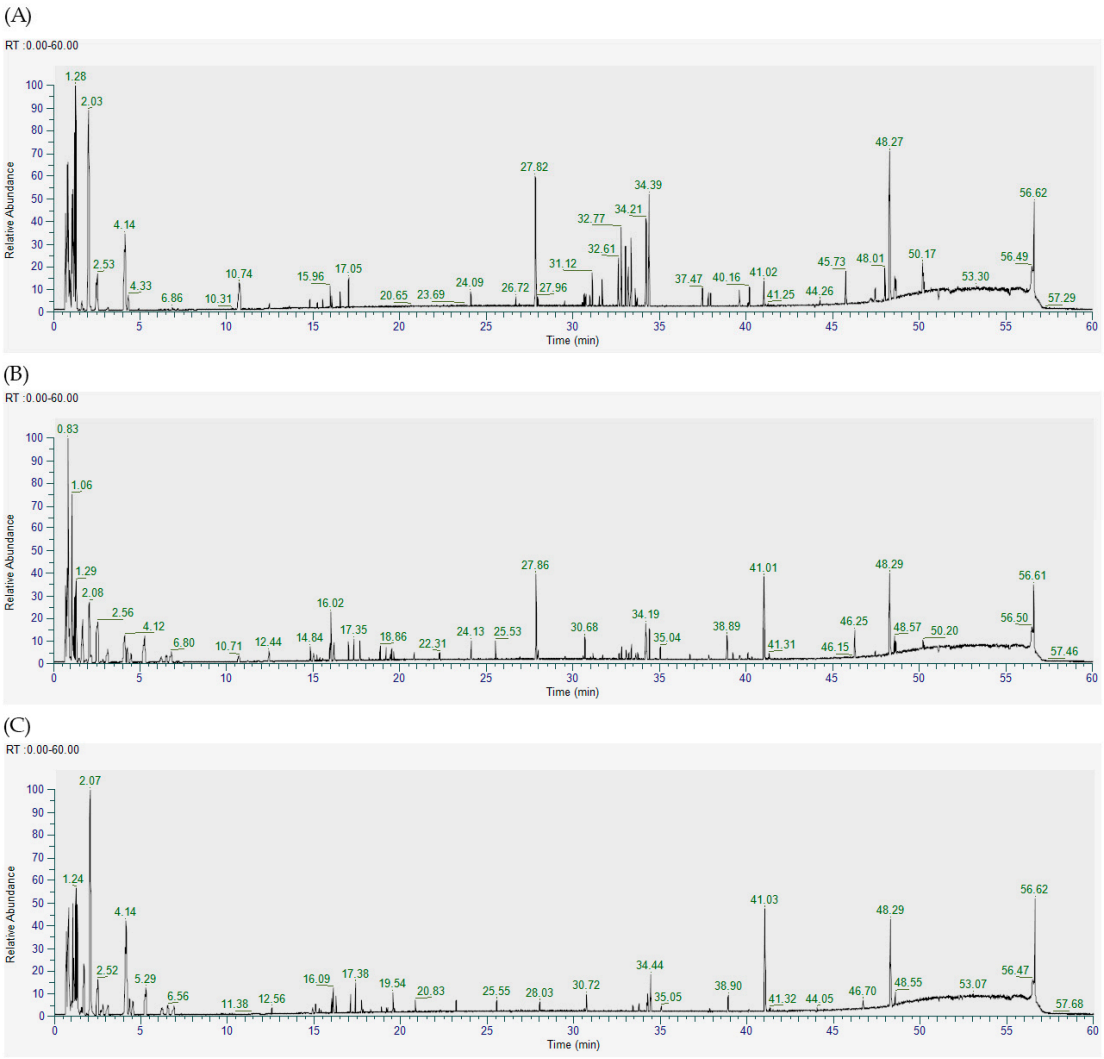
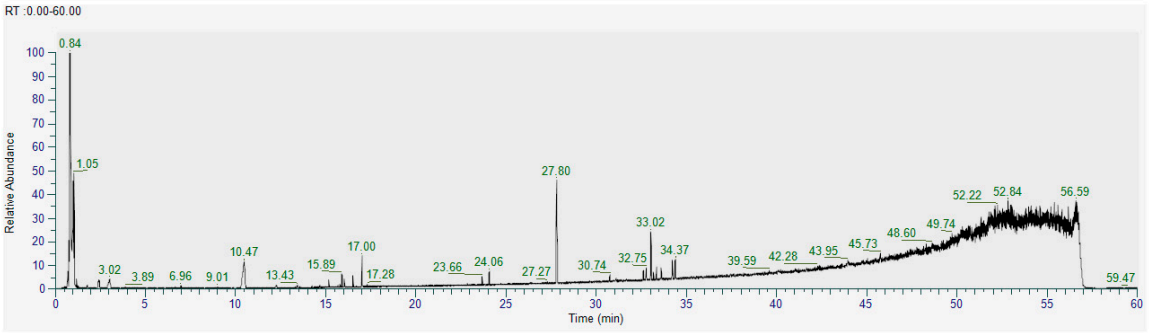
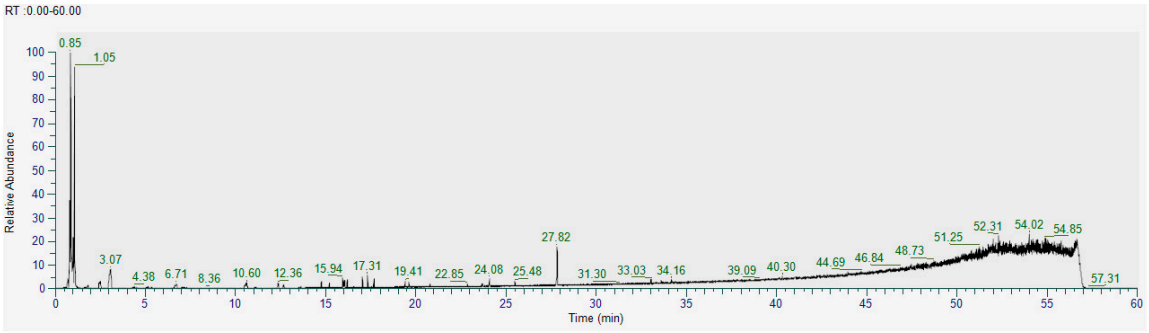



**Figure S1.** Total Ion Chromatogram of methanolic extract of *C. grandis* in positive mode (A) GRS, (B) HRS, (C) FRS.

(A)




(B)




(C)

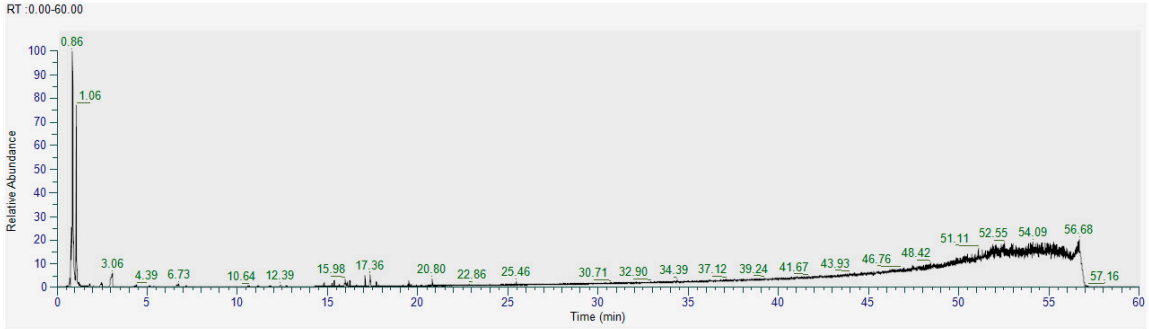
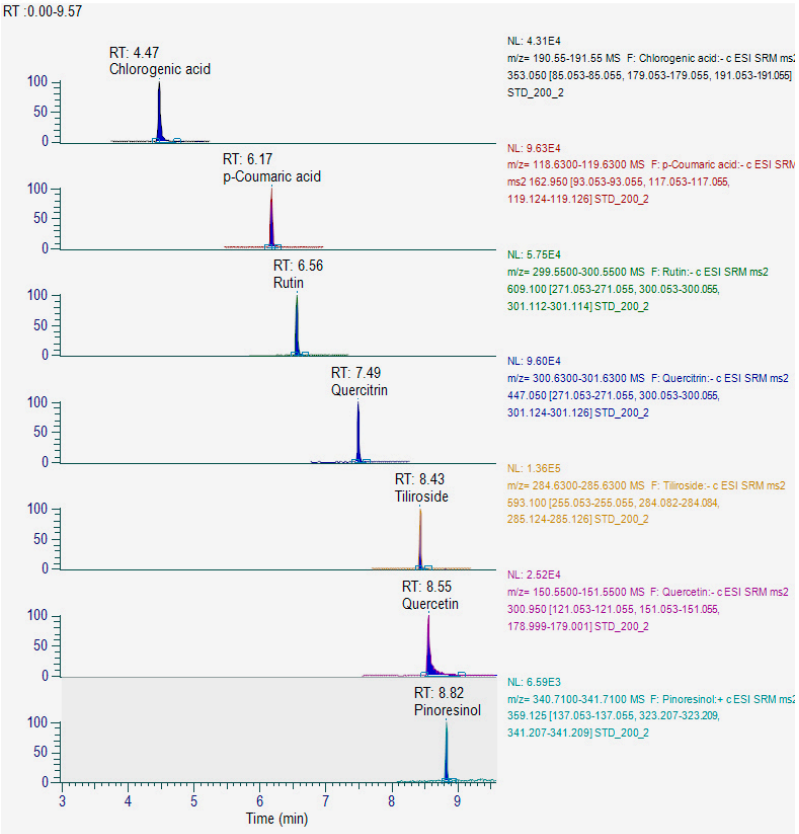
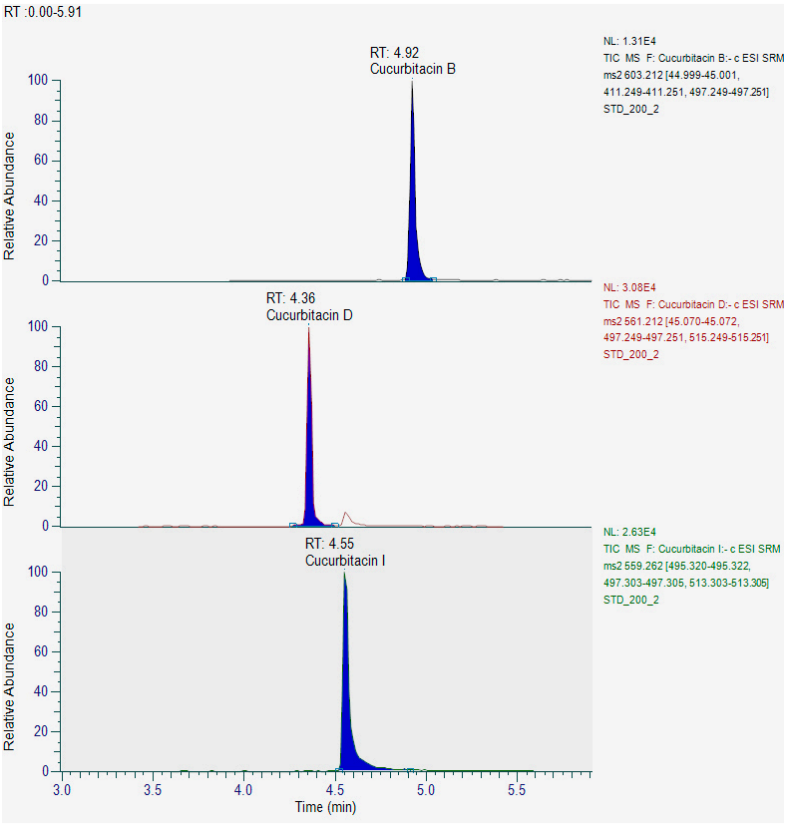



**Figure S2.** Total ion chromatogram (TIC) of methanolic extract of *C. grandis* in negative mode (A) GRS, (B) HRS, (C) FRS**.**

(A)


RT :0.00-9.57
RT: 4.47
Chlorogenic acid
RT: 6.17
p-Coumaric acid
RT: 6.56
Rutin
RT: 7.49
Quercitrin
RT: 8.43
Tiliroside
RT: 8.55
Quercetin
RT: 8.82
Pinoresinol
Time (min)

(B)


RT :0.00-5.91
RT: 4.92
Cucurbitacin B
RT: 4.36
Cucurbitacin D
RT: 4.55
Cucurbitacin I
Relative Abundance
Time (min)

(C)

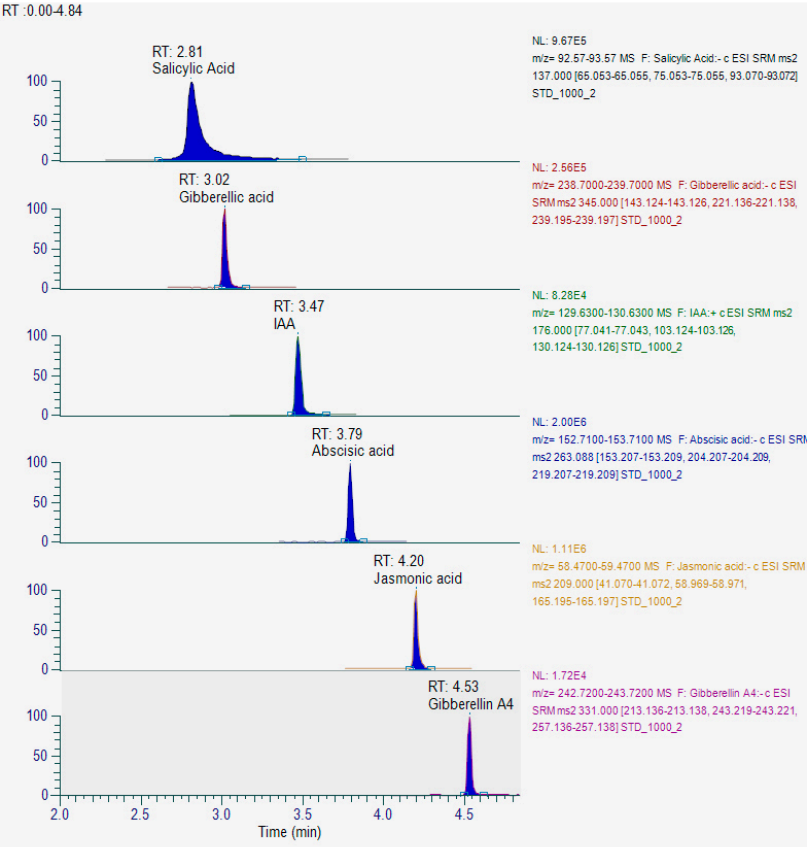



**Figure S3.** Chromatogram of standard solution mixtures (A) Polyphenols (B) Triterpenes (C) Phytohormones**.**

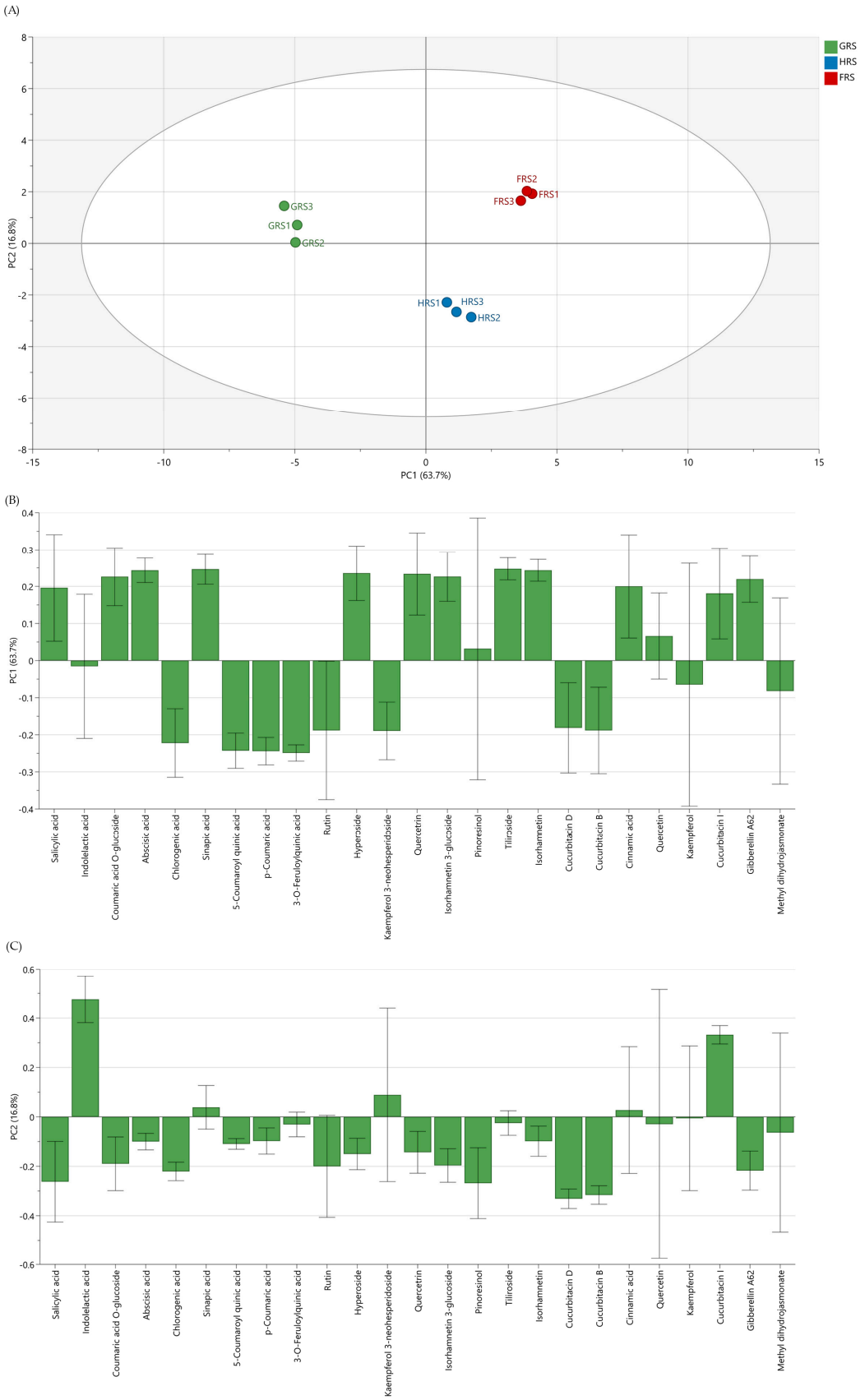



**Figure S4.** Score biplot and loading obtained from LC-MS data of *Coccinia grandis* fruits at different stages of ripening (A) Score plot, (B) Loading plot (PC 1), (C) Loading plot (PC 2).

**Table S1.** Validation data including the range, correlation coefficient (r), slope of the calibration curve, standard deviation, intercept, intercept error, IDL, I-LOQ, LOD, LOQ for the analytes**.**

| Analyte Name | Range | r2 | Slope of the calibration curve (S) | Standard deviation (σ) | Intercept | Intercept error | IDL (ng/mL) | I-LOQ (ng/mL) | LOD = 3.3σ/S | LOQ =10σ/S |
|---|---|---|---|---|---|---|---|---|---|---|
| **Hydroxycinnamic acids** | | | | | | | | | | |
| Chlorogenic acid | 1–200 | 0.9999 | 654.56119 | 2.98072 | −1650.1475 | 1286.00901 | 0.01503 | 0.04554 | 0.15027 | 0.45538 |
| p-Coumaric acid | 1–200 | 0.9999 | 1106.68621 | 4.23729 | −1188.93817 | 1710.09056 | 0.01264 | 0.03829 | 0.12635 | 0.38288 |
| **Flavonols** | | | | | | | | | | |
| Quercetin | 1–200 | 0.9999 | 459.03227 | 1.6648 | −1242.82828 | 324.01067 | 0.01197 | 0.03627 | 0.11968 | 0.36268 |
| Quercitrin | 1–200 | 0.9999 | 944.86202 | 2.70439 | 770.48535 | 235.384 | 0.00945 | 0.02862 | 0.09445 | 0.28622 |
| Rutin | 1–200 | 0.9999 | 583.72238 | 1.69785 | −117.96905 | 330.44387 | 0.00960 | 0.02909 | 0.09599 | 0.29087 |
| Tiliroside | 1–200 | 0.9999 | 1264.20427 | 3.44481 | −1020.57657 | 1091.05152 | 0.00899 | 0.02725 | 0.08992 | 0.27249 |
| **Lignan** | | | | | | | | | | |
| Pinoresinol | 5–200 | 0.9999 | 57.04133 | 0.10122 | 251.61347 | 43.67068 | 0.00586 | 0.01775 | 0.05856 | 0.17745 |
| Triterpenes | | | | | | | | | | |
| Cucurbitacin B | 1–1000 | 0.9999 | 105.98924 | 0.18708 | 196.03561 | 75.50393 | 0.00582 | 0.01765 | 0.05825 | 0.17651 |
| Cucurbitacin D | 1–1000 | 0.9999 | 189.58872 | 0.25215 | 329.78722 | 95.94343 | 0.00439 | 0.01330 | 0.04389 | 0.13300 |
| Cucurbitacin I | 1–1000 | 0.9999 | 30.5554 | 0.0652 | −10.55902 | 23.53632 | 0.00704 | 0.02134 | 0.07042 | 0.21338 |
| **Phytohormone** | | | | | | | | | | |
| Abscisic acid | 1–100 | 0.9999 | 3630.01442 | 16.39196 | −4047.3246 | 1334.5862 | 0.01490 | 0.04516 | 0.29803 | 0.45157 |
| Gibberellic acid | 1–100 | 0.9999 | 739.58361 | 1.39023 | −129.95983 | 59.98068 | 0.00620 | 0.01880 | 0.12406 | 0.18797 |
| Gibberellin A4 | 1–100 | 0.9999 | 37.01639 | 0.41086 | 1.48927 | 19.1456 | 0.03663 | 0.11099 | 0.73256 | 1.10994 |
| Indoleacetic acid | 1–100 | 0.9999 | 318.69701 | 1.45715 | 50.44385 | 32.74528 | 0.01509 | 0.04572 | 0.30177 | 0.45722 |
| Jasmonic acid | 1–100 | 0.9999 | 2031.44078 | 4.66842 | −940.63147 | 104.90961 | 0.00758 | 0.02298 | 0.15167 | 0.22981 |
| Salicylic Acid | 1–100 | 0.9999 | 5014.04266 | 20.58744 | −20757.9842 | 7431.67977 | 0.01355 | 0.04106 | 0.27099 | 0.41060 |