Table S1. Breeding year and breeding organizations of soybean varieties used in this study.

Breeding	Organization					Total
	NICS[1)]	ARES[2)]	University	Institute[3)]	Private	
Before 1980	18	-	-	-	-	18
1980s	17	-	-	-	-	17
1990s	40	3	-	-	-	43
2000–2013	64	9	13	3	5	94
Total	139	12	13	3	5	172

[1)]NICS: National Institute of Crop Science, Rural Development Administration. [2)]ARES: Agricultural Research & Extension Service. [3)]Korea Atomic Energy Research Institute.

Table S2. Analytical conditions of HPLC for Lutein.

Parameter	Condition
Instrument	Waters 600 pump & controller, Waters 717 autosampler, Waters 486 tunable absorbance detector
Wavelength	290nm
Mobile phase	Acetonitrile: Ethyl acetate = Acetonitrile 70 → 0% / 27 min, Acetonitrile 0 → 70% / 50 min
Flow rate	1.0 mL/min
Injection volume	20㎕
Column	YMC-PACK Pro C18 column (250 × 4.6mm)

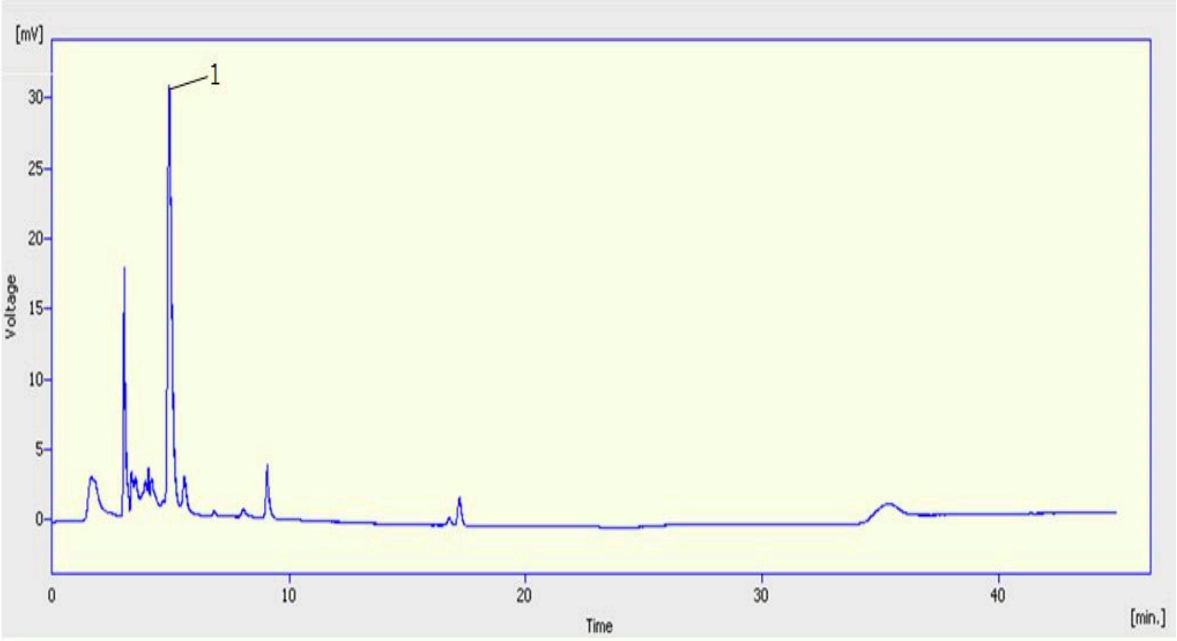

Figure S1. HPLC chromatogram patterns of soybean Lutein. Peak: 1, Lutein

Table S3. Calibration equations of lutein standard.

Composition	Equation of linear regression	Coefficient of determination(R^2)	Linearity range (μg/g)
Lutein	y = 162.16x + 15.296	0.998	0.39–3.13

Table S4. Analytical conditions of HPLC for tocopherol.

Parameter	Condition
Instrument	Waters 600 pump & controller, Waters 717 autosampler, Waters 486 tunable absorbance detector
Wavelength	290 nm
Mobile phase	Hexane with 1.1% IPA(isopropanol)
Flow rate	1.0 mL/min
Injection volume	20㎕
Column	Lichrospher 100 Diol column (250 × 4.6mm)

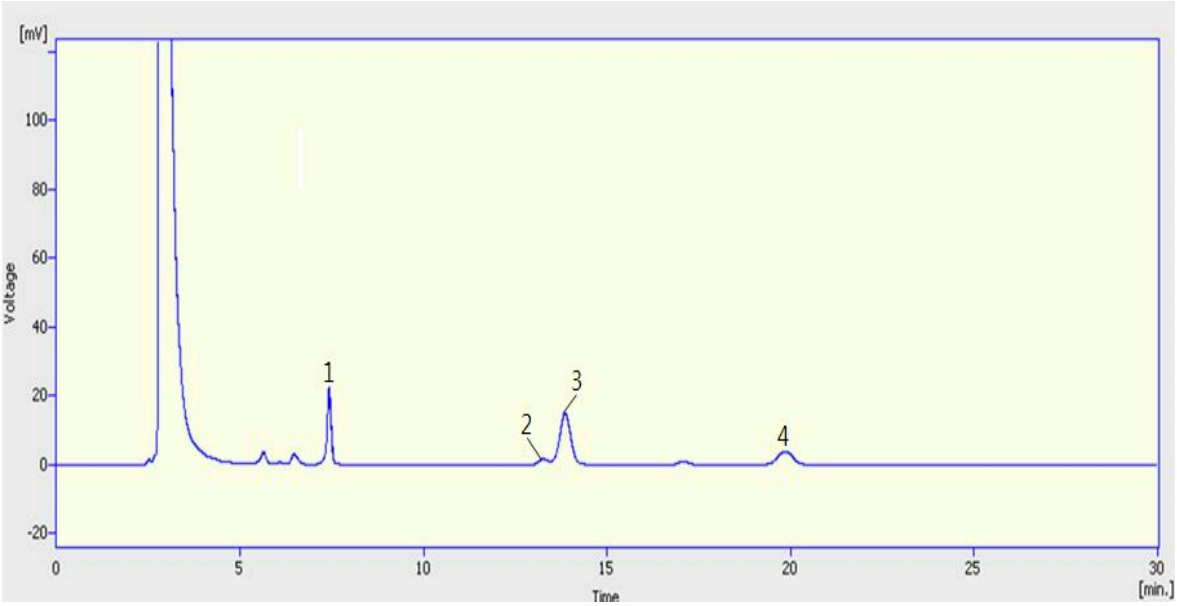

Figure S2. HPLC chromatogram patterns of soybean tocopherols. Peak: 1, α-Tocopherol; 2, β-Tocopherol; 3, γ-Tocopherol; 4, δ-Tocopherol.

Table S5. Calibration equations of tocopherol standards.

Composition	Equation of linear regression	Coefficient of determination (R^2)	Linearity range (μg/g)
α-tocopherol	y = 7.7506x + 13.322	0.999	9.44–75.5
β-tocopherol	y = 8.1738x + 5.7907	0.983	1.96–15.69
γ-tocopherol	y = 5.6284x − 55.114	0.999	19.37–154.94
δ-tocopherol	y = 5.2577x − 19.981	0.998	6.18–49.48

Table S6. Analytical conditions of GC for phytosterols.

Parameter	Condition
Column	HP-5 19091J-413 (30m × 0.32mm) 0.25μm
Oven temperature	From 200 ℃ to 320 ℃ increasing 6 ℃/min
Injector temperature	280 ℃
Detector	290 ℃, H2 flow rate 30, air flow rate 450, N2 as a makeup flow 45 ℃
Carrier gas	He(99.9999%)
Flow rate	1.0 mL/min

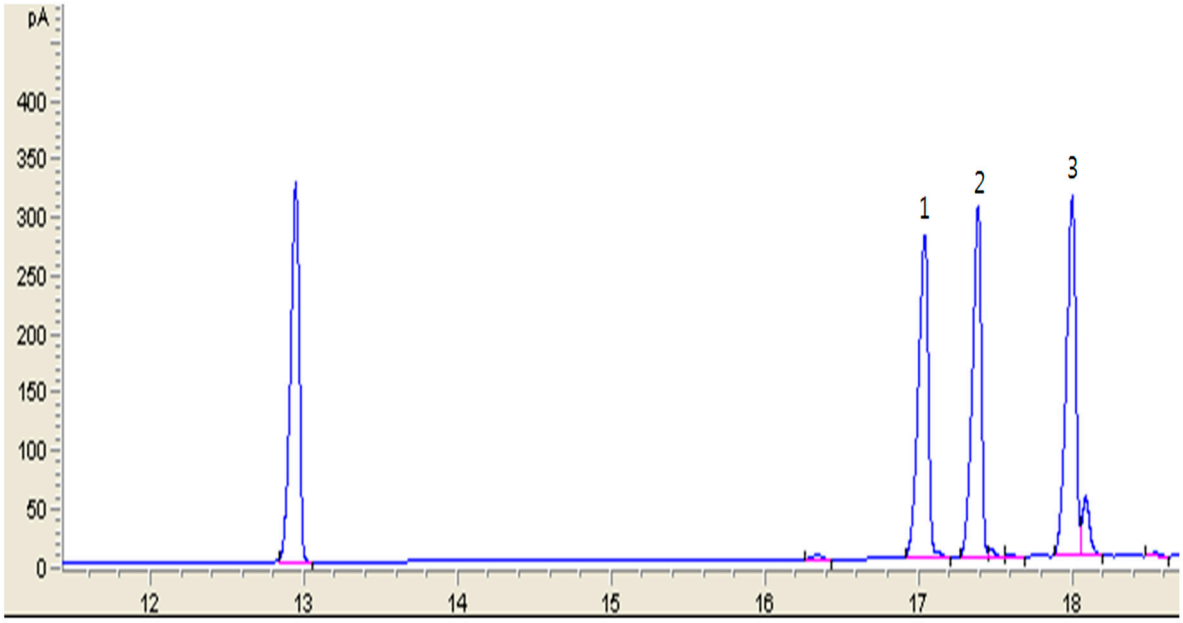

Figure S3. GC chromatogram patterns of seed phytosterols. Peak: 1, campesterol 2, stigmasterol 3, β-sitosterol.

Table S7. Calibration equations of phytosterol standards.

Composition	Equation of linear regression	Coefficient of determination (R^2)	Linearity range (μg/g)
Campesterol	y = 4.601x + 45.125	0.999	31.25–500
Stigmasterol	y = 4.665x + 55.771	0.999	31.25–500
β-sitosterol	y = 5.5292x + 23.083	0.999	31.25–500

Table S9. Principal component analysis in 172 Korean soybean varieties.

Principal component	Eigenvalue	Contribution (%)	Cumulative contribution (%)
PC1	3.270	32.70	32.70
PC2	2.879	28.79	61.49
PC3	1.344	13.44	74.93
PC4	0.983	9.83	84.76
PC5	0.671	6.71	91.47
PC6	0.440	4.40	95.87
PC7	0.256	2.56	98.43
PC8	0.157	1.57	100
PC9	0.000	0	100
PC10	0.000	0	100

Table S10. Correlation coefficients between phytochemicals and principal components in 172 Korean soybean varieties.

Phytochemical	PC1	PC2	PC3
Lutein	0.101	0.220 **	−0.180 *
α-tocopherol	0.429 **	0.344 **	0.682 **
β-tocopherol	0.310 **	0.256 **	0.806 **
γ-tocopherol	0.613 **	0.678 **	−0.315 **
δ-tocopherol	0.598 **	0.616 **	−0.236 **
Total tocopherol	0.675 **	0.711 **	−0.159 *
β-sitosterol	−0.706 **	0.520 **	−0.015
Campesterol	−0.678 **	0.590 **	0.119
Stigmsterol	−0.500 **	0.531 **	−0.008
Total phytosterol	−0.765 **	0.634 **	0.021