



(a)

(b)

Figure S1 Experimental sites at First Farm of Hokkaido University.



(a)

(b)

Figure S2 Experimental sites used in the study. (a) Field; (b) Greenhouse.

Table S1 Climatic conditions of experimental sites during production season.

	Air temperature (°C)				Precipitation (mm)
	Field		Greenhouse		Sum
	Max	Min	Max	Min	
June	30.6	8.8	38.4	12.1	50.5
July	34.3	16.4	41.1	17.1	7.5
August	34.4	13.9	42.8	15.6	108.5
September	26.6	11.1	37.6	12.8	73
October	27.3	7.3	36.6	9.5	150
November			29.5	8.6	

Table S2 Effect of fertilization on sugar to acid ratio (SAR) in the field and greenhouse.

Site	CK	NPK	Digestate	Compost
SAR				
Field	3.47±0.52b	3.55±0.37b	5.11±0.39a	5.14±0.35a
Greenhouse	4.81±0.07b	4.91±0.19b	6.33±0.26a	6.19±0.05a

The different lowercase letters indicate a significant difference between the samples of the same cultivation experiment ($p < 0.05$).

Table S3 Effect of fertilization on phenolic compounds in the field and greenhouse.

Site	CK	NPK	Digestate	Compost	Treatment	F-value
Caffeic acid					CE	1308.17***
Field	0.13±0.01c	0.20±0.01b	0.29±0.00a	0.28±0.01a	FT	1564.69***
Greenhouse	0.45±0.01c	1.35±0.04b	2.22±0.03a	2.24±0.06a	CE×FT	109.04**
Catechin					CE	96.67***
Open field	8.15±0.85c	9.76±0.31b	12.82±0.26a	12.05±0.25a	FT	107.47***
Greenhouse	9.84±0.37c	12.33±0.54b	14.73±0.54a	14.62±0.33a	CE×FT	0.51ns
p-Coumaric acid					CE	2389.01***
Field	0.22±0.02c	0.32±0.02b	0.66±0.03a	0.67±0.01a	FT	174.75***
Greenhouse	1.22±0.10c	1.74±0.10b	2.45±0.12a	2.31±0.09a	CE×FT	33.62***
Ferulic acid					CE	1897.33***
Field	1.04±0.04b	1.47±0.04a	1.45±0.06a	1.49±0.08a	FT	29.41***
Greenhouse	2.61±0.09b	2.88±0.07a	2.94±0.08a	2.88±0.15a	CE×FT	1.51ns
Kaempferol					CE	1253.79***
Field	0.19±0.01c	0.29±0.00b	0.35±0.01a	0.35±0.01a	FT	284.42***
Greenhouse	0.36±0.01c	0.43±0.01b	0.55±0.01a	0.54±0.02a	CE×FT	5.32*
Naringenin					CE	75.81***
Field	0.05±0.01c	0.15±0.02b	0.24±0.01a	0.24±0.01a	FT	233.45***
Greenhouse	0.15±0.01c	0.17±0.01b	0.26±0.00a	0.27±0.01a	CE×FT	13.97***

CE: cultivation environment; FT: fertilization treatment. The different lowercase letters indicate a significant difference between the samples of the same cultivation experiment ($p < 0.05$). Student's t-test (*** $p < 0.001$, ** $p < 0.01$; * $p < 0.05$, ns $p > 0.05$).

S-A1:

Approximately 5 g of homogenate was accurately weighed, diluted to 20.0 mL with ultrapure water (Millipore, Bedford, MA, USA), and incubated for 20 min in a 35 °C water bath. After centrifugation of samples at 10,000 ×g for 10 min (MX-305, TOMY, Tokyo Rikakikai, Tokyo, Japan), the supernatant was removed and filtered through a 0.22- μ m, 25-mm-diameter syringe filter (PTFE, Merck Millipore, Ireland). The filtered solution was then used for sugar and organic acid analyses.

S-A2:

Approximately 5 g of homogenate was accurately weighed and then diluted to 20.0 mL with 80% methanol solution. The samples were shaken for 5 h in a rotator (BioSan, Riga, Latvia), left at 4 °C overnight, and then subjected to ultrasonication for 10 min. After centrifugation of samples at 10,000 ×g for 10 min at 20 °C, the supernatant was filtered through a 0.22- μ m, 25-mm-diameter syringe filter. The filtered solution was then used for analysis of phenolic compounds.