

Supplementary information

Table S1 The concentration of target compounds in standard solution

Compounds	C0(µg/mL)	C1 (µg/mL)	C2 (µg/mL)	C3 (µg/mL)	C4 (µg/mL)
Hexanal	0	50	100	200	400
2-Pentylfuran	0	2.5	5	10	20
Octanal	0	5	10	20	40
2-AP	0	50	100	200	400
(<i>E</i>)-2-Octenal	0	7.5	15	30	60
1-Octen-3-ol	0	7.5	15	30	60
Decanal	0	5	10	20	40
(<i>E</i>)-2-Nonenal	0	2.5	5	10	20
(<i>E, E</i>)-2,4-Decadienal	0	5	10	20	40

Table S2 The retention time and characteristic ions of volatile compounds

Compounds	CAS	Retention time (min)	Qualitative ions (m/z)
Hexanal	66-25-1	7.503	56*, 72, 82
2-Methyl-3-heptanone	13019-20-0	10.281	71, 85, 128*
2-Pentylfuran	3777-69-3	12.435	81*, 82, 95, 138
Octanal	124-13-0	14.137	84*, 100, 110
2-AP	85213-22-5	15.582	66, 83*, 111
(<i>E</i>)-2-Octenal	2548-87-0	18.064	69, 97*, 108
1-Octen-3-ol	3391-86-4	18.818	71, 72*, 85, 99
Decanal	112-31-2	19.944	82, 95, 112*, 128
(<i>E</i>)-2-Nonenal	18829-56-6	20.829	96*, 111, 122
(<i>E, E</i>)-2,4-Decadienal	25152-84-5	27.181	81, 123, 152*

Note: * represented the quantitative ions.

Table S3 The physicochemical properties of target compounds

Compounds	Odor description ^a	Odor threshold ^b (ng·g ⁻¹)	Boiling point ^c (°C)	Vapour pressure ^c (mmHg at 25°C)	Molecular weight ^c
Hexanal	Fruity, grass, green, green tomato, grass-like	5	127.9	10.9	100.161
2-Pentylfuran	Floral, fruity, nutty, almond, beany, green, buttery	5.8	169.7	2.0	138.210
Octanal	Citrus, floral, Lemon, green, fat, slightly fruity	0.0587	163.4	2.1	128.215
2-AP	Popcorn-like, sweet, pleasant, peanut, cooked jasmine rice	0.053	182.9	0.8	111.144
(<i>E</i>)-2-Octenal	Nutty, cooked flour, green, fat	3	190.1	0.6	126.199
1-Octen-3-ol	Raw mushroom, straw	1.5	168.4	0.5	128.215
Decanal	Fatty, citrusy, sweet, floral, waxy	3	209.0	0.2	156.269
(<i>E</i>)-2-Nonenal	Fatty, woody	0.19	205.0	0.3	140.226
(<i>E,E</i>)-2,4-Decadienal	Fatty, metallic, citrus, chicken	0.077	244.6	0.0	152.237

a: Ref.1.

b: Ref.5.

c: The data were obtained from ChemSpider.com.

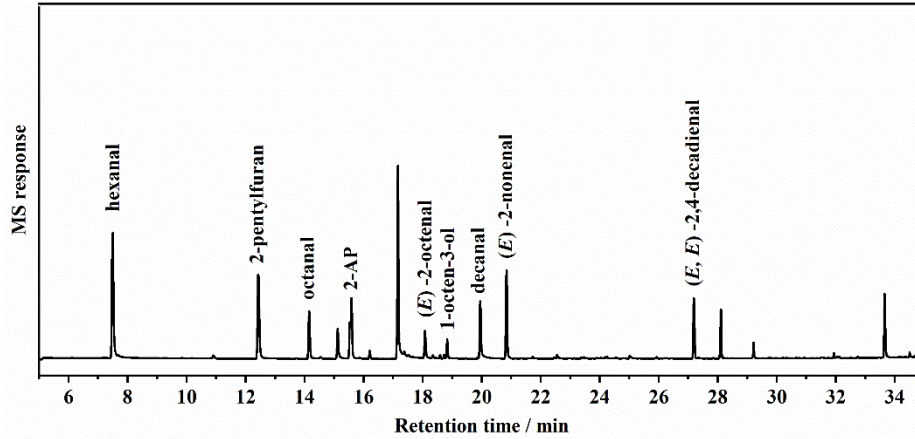


Figure S1 GC-MS-SIM Chromatogram of rice sample. Amount of sample: 5.0g, extraction temperature: 80°C, extraction time: 30 min. The monitor ion for each compound was set as Table A2.

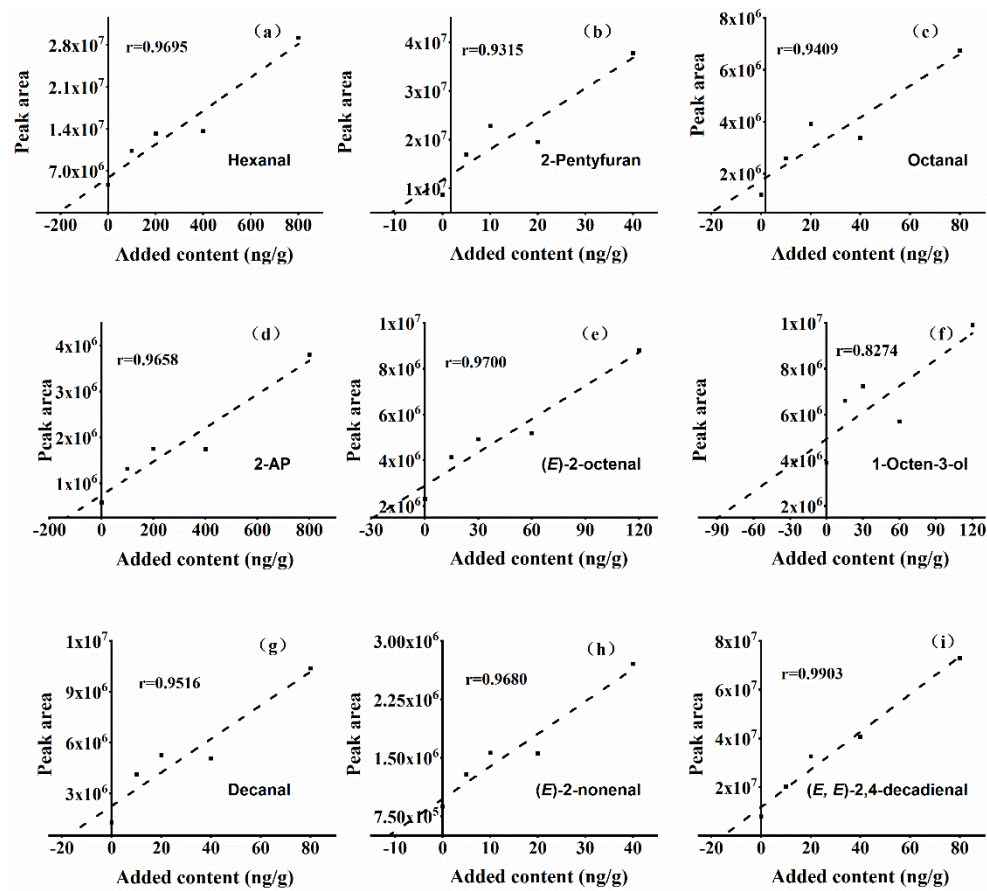


Figure S2 Standard addition working curves for each volatile compound. (a): hexanal; (b): 2-pentylfuran; (c): octanal; (d): 2-AP; (e): (*E*)-2-octenal; (f): 1-octen-3-ol; (g): decanal; (h): (*E*)-2-nonenal; (i): (*E,E*)-2,4-decadienal. The working curves were plotted with the peak area of each compound and added content.

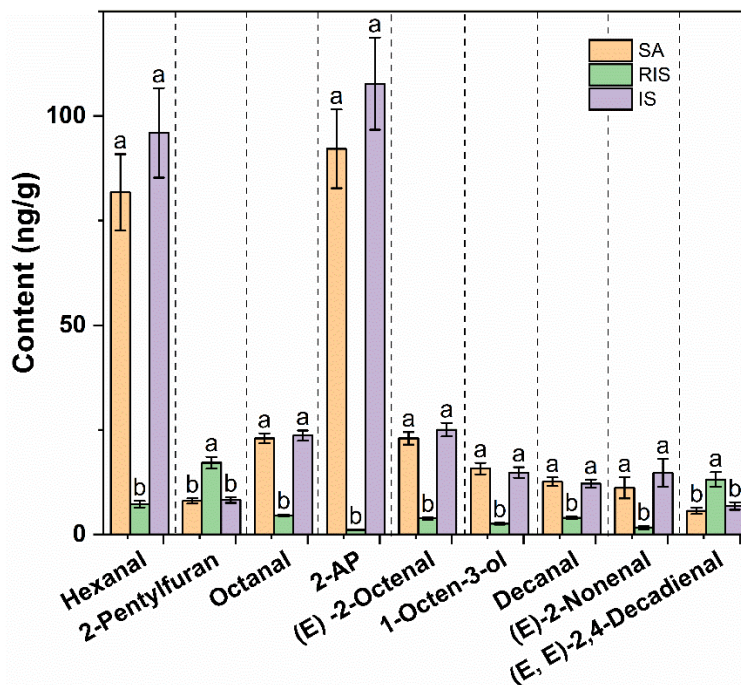


Figure S3 Comparison of the results obtained by different methods. SA: standard addition method, the results were obtained by developed method; RIS: relative internal standard method, the results were the relative content to an internal standard (2-methyl-3-heptanone); IS: internal standard method, the results were obtained by multiplying each relative content by each correction factor.

Method S1 Determination of correction factors

Two portions of one rice sample (5 g) were weighed into two 40 mL headspace vials. Then, 10 μ L of 1 μ g/mL of the internal standard (2-methyl-3-heptanone) was added, followed by either 10 μ L of ethanol or 10 μ L of a mixed standard solution (20 μ g/mL, 20 μ g/mL, 5 μ g/mL, 100 μ g/mL, 5 μ g/mL, 5 μ g/mL, 5 μ g/mL, 5 μ g/mL and 5 μ g/mL for hexanal, 2-pentylfuran, octanal, 2-AP, (*E*)-2-octenal, 1-octen-3-ol, decanal, (*E*)-2-decadienal, and (*E,E*)-2,4-decadienal, respectively) were added. Then SPME-GC-MS analysis was performed according to 2.3, and the determination was repeated three times. The peak area of each target compound and internal

standard were recorded, and the correction factor of the target compound was calculated according to Eqs. B1 and B2.

$$A_3' = A_1 / A_2 \times A_3 \quad \text{Eq. (B1)}$$

A_3' : the corrected average peak area of the target compound in the spiked sample; A_1 : the average peak area of internal standard in the unspiked sample; A_2 : the average peak area of the internal standard in the spiked sample; A_3 : the average peak area of the target compound in the spiked sample.

$$f = A_1 / (A_3' - A_4) \times C_2 / C_1 \quad \text{Eq. (B2)}$$

f : correction factor; A_4 : the average peak area of the target compound in the unspiked samples; C_2 : the content of target compound added to the samples, $\mu\text{g/mL}$; C_1 : the content of the internal standard added to the samples, $\mu\text{g/mL}$.