

Supplementary Materials

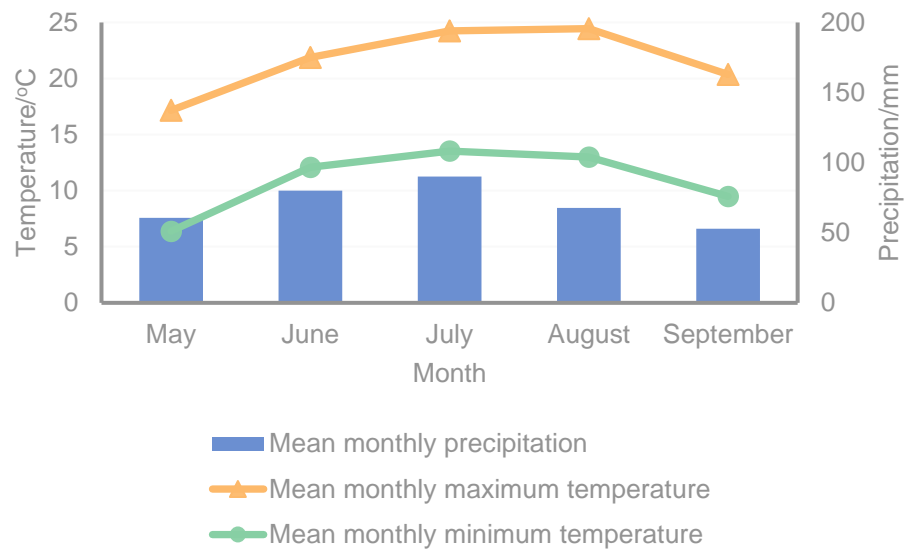


Figure S1. The variation of monthly average temperature and average precipitation in 2019

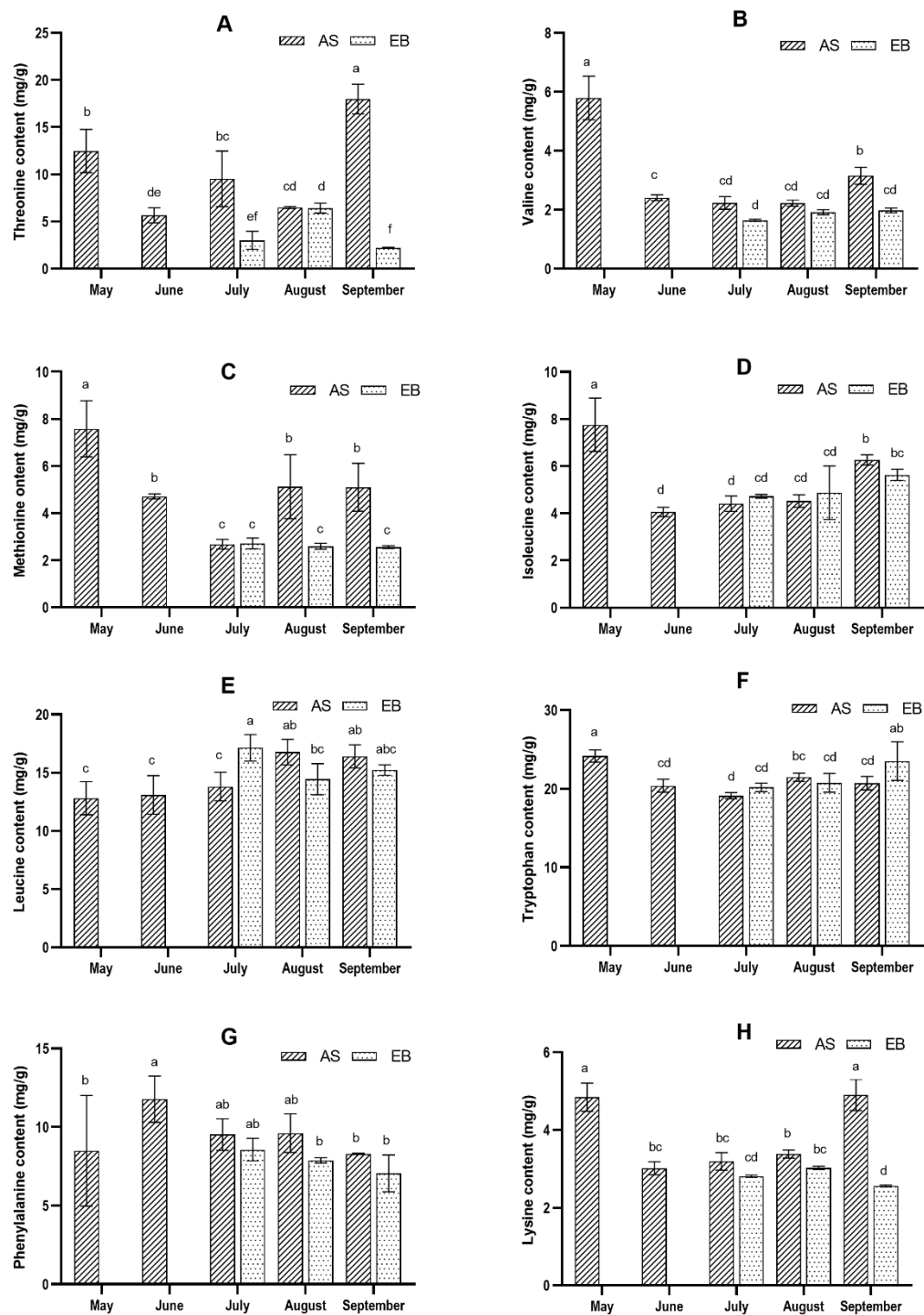


Figure S2. Change in the essential amino acid content of *A. sinensis* in different months: (A) Threonine, (B) Valine, (C) Methionine, (D) Isoleucine, (E) Leucine, (F) Tryptophan, (G) Phenylalanine, (H) Lysine.

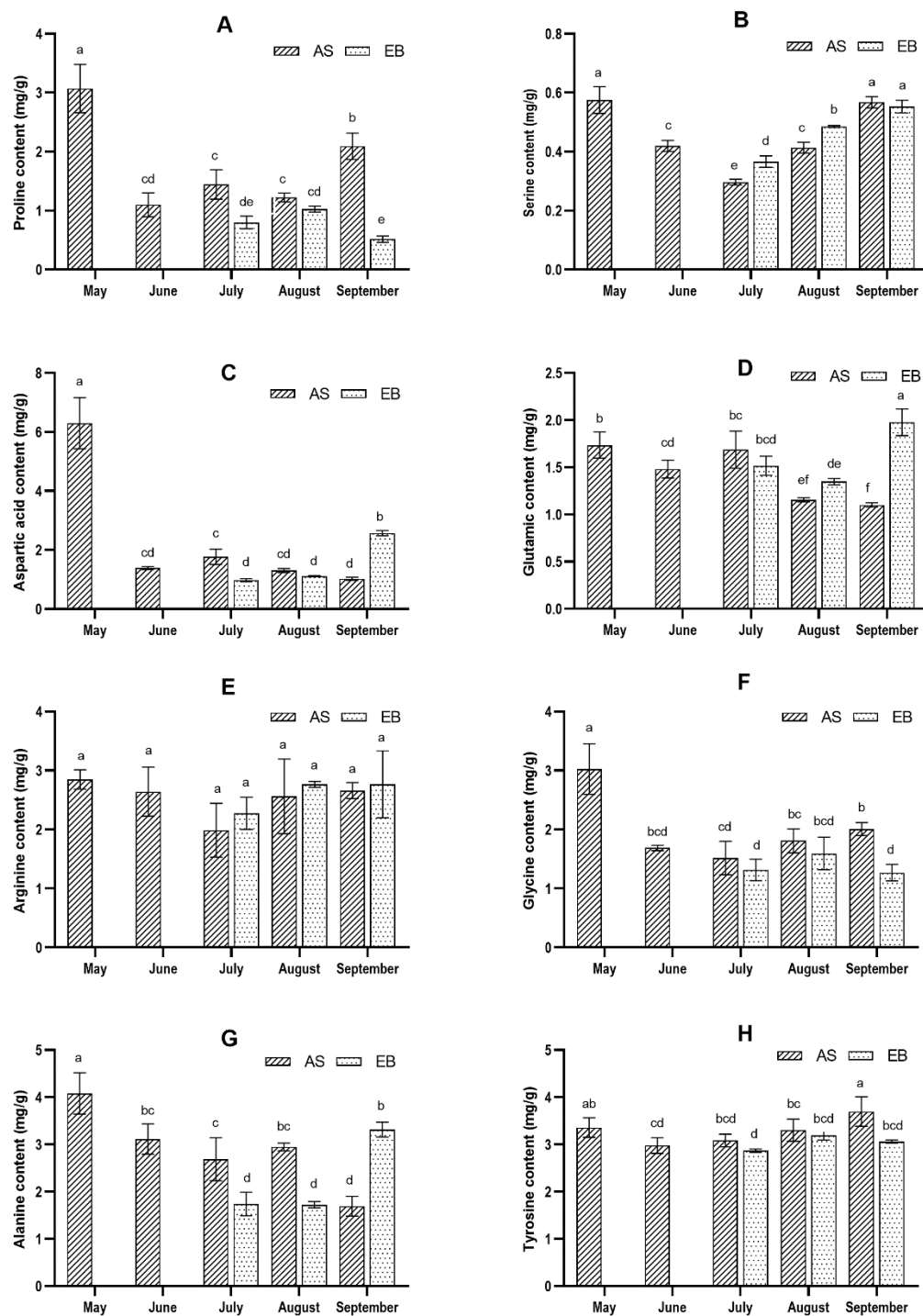


Figure S3. Change in the non-essential amino acid content of *A. sinensis* in different months: (A) Proline, (B) Serine, (C) Aspartic acid, (D) Glutamic, (E) Arginine, (F) Glycine, (G) Alanine, (H) Tyrosine.

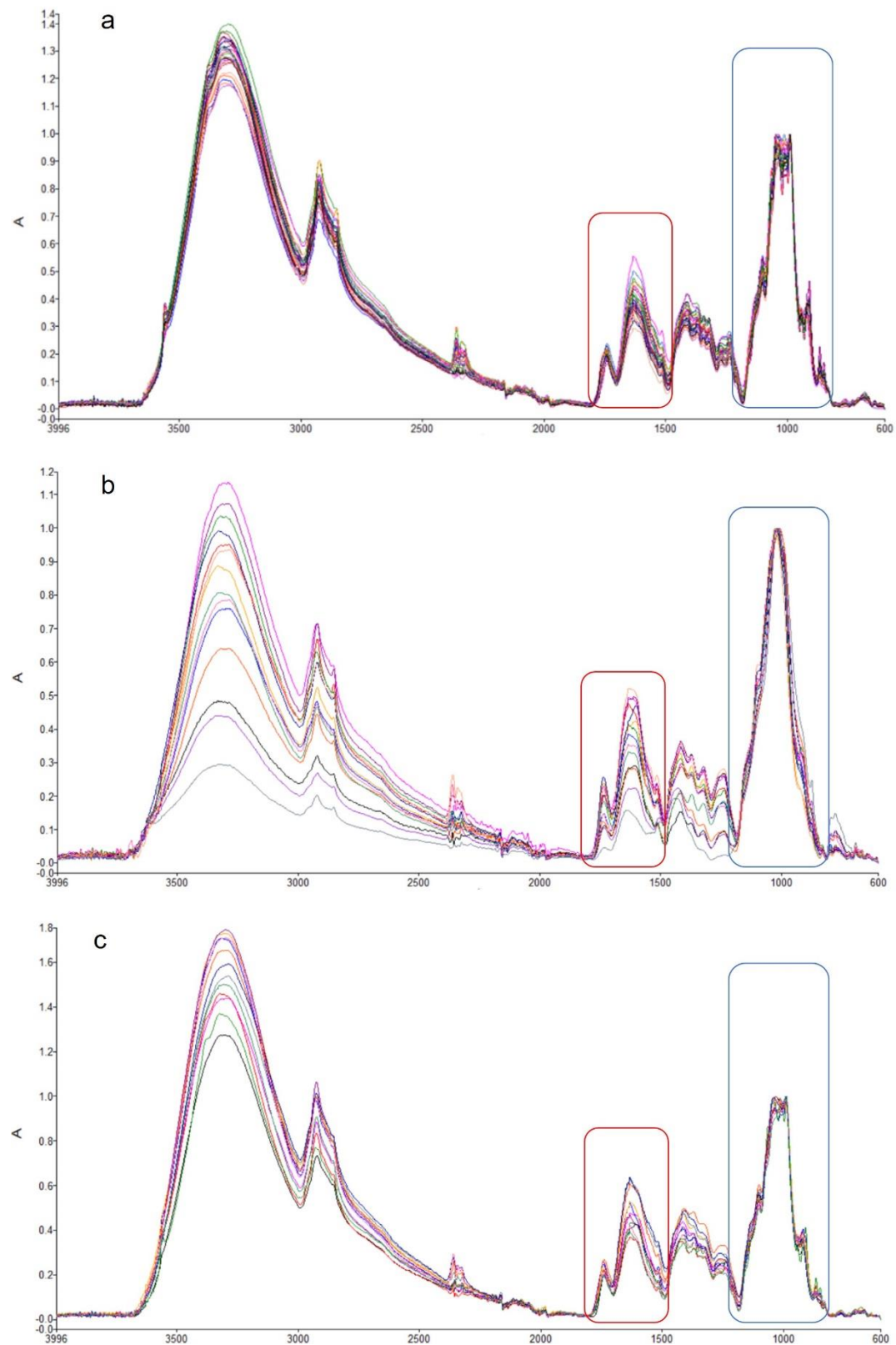


Figure S4. Overall ATR-FTIR spectra of different bolting times in the harvest period: (A) AB root samples, (B) SB root samples and (C) AB root samples

Table S1. Samples information of *A. sinensis* during the root harvest period

Sample	Producing areas	Root length/cm	Root weight/g	Ferulic acid/%	Ligustilide/%	Lignin/%
AS-1	Suigu Village, Min County, Dingxi City	22.30	115.34	0.147	2.474	24.922
		22.10	91.04			
AS-2	Suigu Village, Min County, Dingxi City	21.70	37.64	0.180	3.913	0.260
		16.70	13.67			
AS-3	Mazichuan village, Min County, Dingxi City	22.10	132.03	0.153	2.947	0.264
		18.30	101.79			
		19.50	83.66			
AS-4	Duona Village, Min County, Dingxi City	16.80	81.72	0.137	3.182	0.269
		16.50	111.22			
AS-5	Duona Village, Min County, Dingxi City	20.20	76.53	0.149	2.053	0.232
		12.00	70.21			
		8.70	18.06			
AS-6	Shuguang Village, Min County, Dingxi City	5.70	21.05	0.137	2.974	0.245
		15.40	41.74			
		7.60	17.87			
AS-7	Lizhu Village, Min County, Dingxi City	12.40	141.90	0.184	2.357	0.210

		14.60	72.50			
		15.00	25.37			
AS-8	Lizhu Village, Min County, Dingxi City	10.60	8.98	0.138	3.082	0.260
		13.20	20.06			
AS-9	Qiaojiagou Village, Min County, Dingxi City	13.10	78.01			
		12.70	73.88	0.217	4.164	0.257
AS-10	Qiaojiagou Village, Min County, Dingxi City	16.70	45.03			
		14.10	17.09	0.173	4.663	0.255
		16.40	85.32			
AS-11	Caotan Village, Min County, Dingxi City	16.30	69.09	0.173	3.603	0.216
		19.00	91.45			
AS-12	Caotan Village, Min County, Dingxi City	18.10	38.52		2.156	0.239
		16.50	41.54	0.172		
		19.20	41.14			
AS-13	Anjiashan Village, Min County, Dingxi City	11.80	37.71	0.158	2.933	0.242
		15.70	30.55			
AS-14	Linha Village, Min County, Dingxi City	20.20	135.44			
		16.40	25.57	0.171	4.013	0.257
AS-15	Linha Village, Min County, Dingxi City	18.20	52.63			
		14.80	5.74	0.180	3.264	0.244

AS-16	Wuna Village, Min County, Dingxi City	19.20	86.13	0.154	2.211	0.230
		16.40	70.08			
AS-17	Dongtan Village, Tianzhu County, Wuwei City	19.80	56.57	0.170	2.346	0.227
		21.60	36.14			
AS-18	Heigou Village, Tianzhu County, Wuwei City	11.20	8.06	0.144	2.049	0.238
		19.40	39.91			
AS-19	Heyan Village, Tianzhu County, Wuwei City	17.70	159.64	0.129	2.538	0.223
		23.30	115.44			
AS-20	Jianshan Village, Tianzhu County, Wuwei City	21.80	112.96	0.217	2.721	0.233
		15.40	97.02			
AS-21	Shangquantan Village, Tianzhu County, Wuwei City	19.30	44.95	0.178	3.738	0.252
		18.70	65.20			
AS-22	Huangjiading Village, Linzhao County, Dingxi City	14.50	82.61	0.125	4.723	0.246
		17.50	47.31			
		13.20	6.13			
		16.50	1.26			
AS-23	Huangjiading Village, Linzhao County, Dingxi City	12.00	2.15	0.128	3.656	0.228
		13.30	0.76			
		12.10	10.35			
AS-24	Xialuo Village, Dangchang County, Longnan City	18.60	92.26	0.184	2.721	0.233

		17.20	11.92			
		16.60	22.60			
		16.00	13.73			
		16.90	18.61			
		20.00	113.12			
		17.10	80.60			
AS-25	Majie Village, Dangchang County, Longnan City	16.20	87.52	0.208	2.489	0.266
		13.50	32.33			
		20.90	59.23			
		17.60	53.93			
AS-26	Gufeng Village, Gulang County, Wuwei City	12.10	73.10	0.163	1.988	0.261
		20.00	74.67			
AS-27	Yangjiasi Village, Weiyuan County, Dingxi City	22.50	46.87	0.249	5.857	0.253
		18.50	14.25			
		17.50	37.39			
AS-28	Jianshan Village, Weiyuan County, Dingxi City	13.30	41.44	0.201	4.810	0.237
		11.10	15.42			
		10.10	13.56			
AS-29	Benmiao Village, Huichuan County, Dingxi City	12.60	21.74	0.165	3.015	0.229
		8.80	4.27			

		14.80	5.88			
		15.50	21.53			
		13.40	7.07			
		11.00	19.30			
		9.30	5.38			
		7.40	5.72			
SB-1	Mazichuan Village, Min County, Dingxi City	8.70	3.63	0.112	1.103	0.292
		5.90	2.68			
		7.20	2.93			
		11.70	19.69			
SB-2	Suigu Village, Min County, Dingxi City	16.50	6.74	0.057	1.340	0.261
		16.50	7.06			
		16.00	9.16	0.105	1.130	0.266
SB-3	Lizhu Village, Min County, Dingxi City	8.70	3.57			
		13.00	20.24			
SB-4	Caotan Village, Min County, Dingxi City	16.60	13.50	0.053	0.690	0.291
		13.50	7.55			
		11.10	12.48			
SB-5	Heyan Village, Tianzhu County, Wuwei City	9.80	4.68	0.014	0.514	0.273
		10.00	3.52			

		12.00	9.05			
		9.80	5.75			
		12.50	6.30			
		6.90	14.49			
SB-6	Jianshan Village, Tianzhu County, Wuwei City	11.60	50.81	0.071	0.967	0.239
		8.90	10.40			
SB-7	Shangquantan Village, Tianzhu County, Wuwei City	16.90	7.28	0.069	1.033	0.308
		13.50	6.58			
		8.50	12.27			
		9.00	5.56			
SB-8	Huangjiading Village, Linzhao County, Dingxi City	5.00	4.41	0.130	1.149	0.273
		6.70	2.07			
		10.50	2.01			
SB-9	Majie Village, Dangchang County, Longnan City	9.10	9.66	0.080	0.877	0.298
		9.00	6.59			
SB-10	Xialuo Village, Dangchang County, Longnan City	6.30	12.52	0.076	0.721	0.272
		9.50	14.70			
SB-11	Gufeng Village, Gulang County, Wuwei City	10.4	6.02	0.045	0.670	0.285
		8.40	23.38			
SB-12	Jianshan Village, Tianzhu County, Wuwei City	9.40	9.77	0.097	1.154	0.218

		11.60	43.10			
SB-13	Yangjiasi Village, Weiyuan County, Dingxi City	8.70	3.55	0.090	0.981	0.350
		6.10	4.25			
SB-14	Benmiao Village, Huichuan County, Dingxi City	4.40	12.86	0.014	0.551	0.233
		5.40	6.50			
AB-1	Mazichuan Village, Min County, Dingxi City	13.60	123.40	0.168	1.934	0.266
		15.80	87.74			
		17.60	78.14			
AB-2	Duona Village, Min County, Dingxi City	18.70	78.39	0.179	1.540	0.249
		15.80	45.07			
		18.40	98.40			
		15.70	29.66			
AB-3	Wuna Village, Min County, Dingxi City	18.30	22.52	0.143	1.380	0.253
		19.30	30.29			
		18.70	81.60			
		14.00	97.73			
AB-4	Liha Village, Min County, Dingxi City	9.80	45.70	0.092	1.804	0.238
		6.90	26.74			
AB-5	Heigou Village, Tianzhu County, Wuwei City	13.00	20.69	0.130	0.876	0.242
		12.30	8.40			

AB-6	Dongtan Village, Tianzhu County, Wuwei City	10.00	17.81	0.116	1.226	0.250
		24.10	19.53			
AB-7	Huangjiading Village, Linzhao County, Dingxi City	13.50	72.84	0.239	2.537	0.262
		11.50	50.10			
AB-8	Majie Village, Dangchang County, Longnan City	12.40	47.81	0.209	1.741	0.245
		13.30	34.38			
AB-9	Xialuo Village, Dangchang County, Longnan City	11.70	16.99	0.185	3.241	0.253
		18.60	105.52			
AB-10	Gufeng Village, Gulang County, Wuwei City	10.40	63.39	0.107	1.251	0.267
		19.10	53.29			
AB-11	Yangjiasi Village, Weiyuan County, Dingxi City	23.10	62.73	0.108	1.324	0.241
		14.70	38.33			
AB-12	Benmiao Village, Huichuan County, Dingxi City	13.50	14.60	0.231	2.586	0.292
		5.50	14.11			
		11.50	45.32			
		9.50	30.64			

Table S2. The calibration curve of target ingredients

Ingredients	Calibration curves	Related coefficient (R^2)
Glucose	$y = 8.3224x + 0.0238$	0.9957
Bovine serum albumin	$y = 1.0328x - 0.0113$	0.9978
Aspartic acid	$y = 794771695.1x - 5154.18264$	0.9999
Glutamic	$y = 689728928.5x - 4925.76946$	0.9999
Serine	$y = 11031886054.0x - 225339.42860$	0.9949
Arginine	$y = 948120475.5x - 1577.70817$	0.9925
Glycine	$y = 799568974.6x - 5546.63174$	0.9998
Threonine	$y = 620208409.3x + 8122.52994$	0.9988
Proline	$y = 122714429.8x - 2866.33533$	0.9955
Alanine	$y = 1793349036.0x - 19172.81437$	0.9998
Valine	$y = 595828728.9x - 5823.73653$	0.9989
Methionine	$y = 662691616.8x - 4509.14970$	0.9991
Isoleucine	$y = 299348470.1x - 8414.06226$	0.9965
Leucine	$y = 912231372.5x - 546.07843$	0.9984
Tryptophan	$y = 1021649334.0x - 43539.47605$	0.9981
Phenylalanine	$y = 445585846.3x + 2892.64981$	0.9932
Lysin	$y = 979015908.2x - 22262.83234$	0.9999
Tyrosine	$y = 588521850.2x - 15652.05988$	0.9997
Ferulic acid	$y = 5032691.1010x - 297.1657$	0.9999
Ligustilide	$y = 516197.0035x$	0.9999
Lignin	$y = 28.707x + 0.1724$	0.9921
Total C element	$y = 8923.00529x - 316.3809x^2$	0.9999
Total N element	$y = 3231.03527x$	0.9998