

1

Supplementary material

2 **Table S1** The content and kinds of amino acids in highland barley (g/100g) (AL-Ansi
3 et al., 2020).

Amino acids	Content
Asp	0.786 ± 0.04
Glu	3.129 ± 0.15
Ser	0.401 ± 0.02
His	0.326 ± 0.02
Gly	0.509 ± 0.03
Thr	0.438 ± 0.02
Arg	0.521 ± 0.03
Ala	0.465 ± 0.02
Tyr	0.273 ± 0.01
Cys-s	0.002 ± 0.00
Val	0.651 ± 0.03
Met	0.127 ± 0.01
Phe	0.666 ± 0.03
Ile	0.451 ± 0.02
Leu	0.782 ± 0.04
Lys	0.386 ± 0.02
Pro	1.001 ± 0.05
TAA	10.91 ± 0.57

4 Note: Results are the mean of three samples ± standard deviation. Total amino acids

5 (TAA).

6 **Table S2** Fatty acids composition of highland barley (%) (AL-Ansi et al., 2020).

Fatty acids	Content
C15:1	1.06 ± 0.05
C16	19.11 ± 0.96
C18	2.00 ± 0.10
C18:1C	18.82 ± 0.94
C18:2C	51.54 ± 2.58
C18:3n6	4.41 ± 0.22
C18:3n3	0.95 ± 0.05
C22:1	1.51 ± 0.05
C24:0	0.35 ± 0.02
C22:5n6	0.25 ± 0.01

7 Note: Results are the mean of three samples ± standard deviation.

8 **Table S3** Profile of phenolic acids and flavonoids in colored highland barley grains ($\mu\text{g/g}$) (Mean \pm SD) (Dang et al., 2022).

Compounds		Purple	Blue	Black	Yellow
	Phloxol	2.88 \pm 0.32 c	3.71 \pm 1.71 b	82.05 \pm 0.70 a	1.50 \pm 0.17 d
	Gallic acid	10.26 \pm 0.12 b	9.11 \pm 0.29 c	20.47 \pm 0.92 a	10.10 \pm 0.26 b
	Protocatechuic acid	36.63 \pm 3.64 b	24.98 \pm 5.52 c	22.93 \pm 3.51 d	40.88 \pm 5.44 a
	Chlorogenic acid	32.72 \pm 0.98 c	28.32 \pm 1.08 d	35.94 \pm 1.43 b	50.56 \pm 0.84 a
	2,4-Dihydroxybenzoic acid	2.52 \pm 1.31 c	6.53 \pm 1.23 a	0.68 \pm 0.27 d	4.86 \pm 0.92 b
Phenolic acids	Vanillic acid	10.78 \pm 4.35 b	5.10 \pm 0.84 c	12.20 \pm 0.90 a	5.75 \pm 1.71 c
	Syringic acid	5.07 \pm 0.24 a	3.44 \pm 0.25 b	3.29 \pm 0.34 ab	4.56 \pm 0.35 a
	p-coumaric acid	6.98 \pm 0.37 c	9.25 \pm 1.26 b	11.76 \pm 2.46 a	4.31 \pm 0.75 d
	Ferulic acid	4.15 \pm 0.16 b	2.52 \pm 0.17 c	4.24 \pm 0.18 b	7.22 \pm 1.18 a
	Salicylic acid	8.04 \pm 0.19 ab	8.34 \pm 0.44 a	7.65 \pm 0.16 b	7.68 \pm 0.33 b
	benzoic acid	42.73 \pm 4.28 a	2.78 \pm 0.46 a	15.56 \pm 1.43 b	3.16 \pm 1.46 b

	O-coumaric acid	9.49 ± 3.2 a	2.36 ± 2.03 c	6.95 ± 0.42 b	9.29 ± 0.44 a
	Veratric acid	16.30 ± 0.28 b	9.00 ± 0.78 c	20.36 ± 2.15 a	5.11 ± 1.36 d
	TPAH	188.55 ± 8.1 b	115.44 ± 5.58 d	244.08 ± 17.15 a	154.97 ± 7.64 c
	Catechin	33.65 ± 4.36 b	33.09 ± 1.71 c	41.44 ± 2.71 b	46.94 ± 2.72 a
	Naringin	6.63 ± 0.43 a	2.37 ± 0.16 d	4.06 ± 0.44 b	3.05 ± 0.76 c
	Hesperidin	3.47 ± 1.12 a	2.01 ± 0.92 b	3.59 ± 1.22 a	nd
	Myricetin	0.47 ± 0.18 b	nd	0.57 ± 0.26 b	2.68 ± 1.45 a
Flavonoids	Quercetin	7.69 ± 4.22 b	nd	5.53 ± 0.93 c	12.21 ± 0.24 a
	Naringenin	9.08 ± 0.36 a	8.25 ± 3.70 b	7.46 ± 0.22 c	5.32 ± 0.10 d
	Kaempferol	13.36 ± 0.19 a	8.60 ± 7.66 c	14.05 ± 0.35 a	9.58 ± 0.46 b
	Rutin	8.46 ± 0.82 c	11.01 ± 5.55 b	9.15 ± 0.45 bc	10.32 ± 1.12 a
	TFH	82.81 ± 4.13 b	65.33 ± 0.12 c	85.85 ± 2.11 b	90.10 ± 2.38 a

TPH	271.36 ± 69.11 b	180.77 ± 57.92 d	329.93 ± 177.02 a	245.07 ± 105.55 c
-----	------------------	------------------	-------------------	-------------------

9 Note: Different letters after data within the same line indicate significant differences ($p < 0.05$). nd: not detected; TPAH, TFH, and TPH: total
10 phenolic acid content, total flavonoid content, and total phenol content detected by HPLC, respectively.