

Table S1. Amino acid profile raw material (mg/g protein).

Amino acid	WF	ChF	HF	BF
Essential amino acids (EAA)				
Histidine	23.04 ^c ± 0.79	28.90 ^{ab} ± 1.16	29.75 ^a ± 1.54	26.23 ^b ± 0.19
Isoleucine	32.75 ^b ± 0.60	35.34 ^b ± 1.43	40.70 ^a ± 2.29	35.65 ^b ± 0.17
Leucine	67.15 ^a ± 1.26	66.39 ^a ± 2.77	69.35 ^a ± 3.77	66.44 ^a ± 0.49
Lysine	20.79 ^d ± 0.47	50.42 ^b ± 2.09	37.32 ^c ± 2.03	62.37 ^a ± 0.31
Methionine	14.66 ^c ± 0.50	38.25 ^a ± 3.70	24.47 ^b ± 0.22	17.95 ^c ± 0.42
Phenylalanine	47.89 ^a ± 1.14	50.65 ^a ± 2.18	47.08 ^a ± 2.73	45.74 ^a ± 0.18
Threonine	25.10 ^c ± 0.47	36.80 ^{ab} ± 1.47	35.48 ^b ± 1.78	39.54 ^a ± 0.23
Valine	39.48 ^b ± 1.00	48.31 ^a ± 2.22	52.81 ^a ± 3.17	50.91 ^a ± 0.40
Total EAA	270.85 ^b ± 6.09	355.05 ^a ± 9.89	336.97 ^a ± 17.13	344.82 ^a ± 2.40
Endogenous amino acids (non-EAA)				
Alanine	29.01 ^c ± 0.57	51.29 ^a ± 2.19	46.84 ^b ± 2.44	46.80 ^{ab} ± 0.27
Arginine	36.88 ^c ± 0.62	105.93 ^b ± 3.99	126.99 ^a ± 7.70	107.79 ^b ± 0.65
Aspartic acid	42.11 ^d ± 0.71	87.33 ^c ± 3.38	112.33 ^a ± 5.73	101.44 ^b ± 0.65
Cysteine	20.96 ^b ± 0.55	26.52 ^a ± 1.88	16.71 ^c ± 0.11	22.21 ^b ± 0.54
Glutamic acid	371.65 ^a ± 7.18	193.67 ^b ± 8.30	189.31 ^b ± 10.92	197.52 ^b ± 1.15
Glycine	34.76 ^c ± 0.63	50.95 ^b ± 2.14	47.42 ^b ± 2.37	63.73 ^a ± 0.52
Proline	119.28 ^a ± 3.22	34.33 ^b ± 2.05	34.95 ^b ± 0.28	33.65 ^b ± 0.81
Serine	47.39 ^b ± 1.09	56.51 ^a ± 2.16	51.26 ^b ± 2.72	52.45 ^{ab} ± 0.47
Tyrosine	27.11 ^b ± 0.47	38.41 ^a ± 1.38	37.22 ^a ± 2.74	29.59 ^b ± 0.00
Total non-EAA	729.15 ^a ± 14.07	644.95 ^b ± 23.71	663.03 ^b ± 34.99	655.18 ^b ± 5.08

Explanatory notes:

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WF – wheat flour; ChF – chia flour; HF – hemp flour; BF – buckwheat flour; different superscript letters within a row indicate significant differences at $p < 0.05$

Table S2. Fatty acids profile of raw materials.

Fatty acid	WF	ChF	HF	BF
C16:0	17.86 ^a ± 0.06	7.35 ^c ± 0.06	7.07 ^d ± 0.03	14.07 ^b ± 0.10
C18:0	1.03 ^d ± 0.01	2.74 ^b ± 0.01	2.96 ^a ± 0.04	2.04 ^c ± 0.03
C18:1 cis	10.71 ^c ± 0.00	5.93 ^d ± 0.01	11.72 ^b ± 0.06	35.78 ^a ± 0.10
C18:1 trans	0.91 ^b ± 0.00	0.77 ^c ± 0.02	0.90 ^b ± 0.00	1.30 ^a ± 0.01
C18:2 n-6 cis	64.24 ^a ± 0.05	20.18 ^d ± 0.14	56.05 ^b ± 0.01	35.86 ^c ± 0.06
C18:3 n-6	–	–	3.29 ^a ± 0.01	–
C18:3 n-3	4.18 ^c ± 0.02	62.49 ^a ± 0.05	15.84 ^b ± 0.02	1.92 ^d ± 0.01
C20:0	–	0.41 ^c ± 0.00	1.17 ^b ± 0.01	1.89 ^a ± 0.01
C22:6 DHA n-3	0.58 ^b ± 0.01	–	0.51 ^c ± 0.01	3.63 ^a ± 0.18
C22:0	0.24 ^c ± 0.00	–	0.49 ^b ± 0.00	2.13 ^a ± 0.01
C24:0	0.26 ^b ± 0.00	–	–	1.37 ^a ± 0.02
SFA*	19.38 ^b ± 0.07	10.51 ^d ± 0.06	11.69 ^c ± 0.00	21.51 ^a ± 0.04
MUFA	11.62 ^c ± 0.01	6.71 ^d ± 0.03	12.62 ^b ± 0.06	37.08 ^a ± 0.09
PUFA	69.01 ^c ± 0.07	82.67 ^a ± 0.09	75.69 ^b ± 0.06	41.41 ^d ± 0.13
PUFA/SFA	3.56 ^c ± 0.02	7.87 ^a ± 0.03	6.48 ^b ± 0.01	1.93 ^d ± 0.01
n6	64.24 ^a ± 0.05	20.18 ^d ± 0.14	59.34 ^b ± 0.02	35.86 ^c ± 0.06
n3	4.77 ^d ± 0.02	62.49 ^a ± 0.05	16.35 ^b ± 0.03	5.55 ^c ± 0.19
n-6/n-3	13.48 ^a ± 0.06	0.32 ^d ± 0.00	3.63 ^c ± 0.01	6.46 ^b ± 0.23

Explanatory notes:

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WF – wheat flour; ChF – chia flour; HF – hemp flour; BF – buckwheat flour ; *SFA–saturated fatty acids; MUFA–monounsaturated fatty acids; PUFA–polyunsaturated fatty acids; different superscript letters within a row indicate significant differences at $p < 0.05$

Table S3. Antioxidant compounds in *Cistus incanus* sample (mg/100 g).

Compound (mg /100 g)	Cistus
Phenolic acids	
Gallic acid	2447.01 ± 1.05
3,4-Dihydroxybenzoic acid	131.78 ± 3.10
Chlorogenic acid	8.73 ± 0.81
Caffeic acid	9.07 ± 0.87
Vanillic acid	112.50 ± 7.85
Syringic acid	–
Ferulic acid	27.50 ± 1.31
Sinapic acid	19.17 ± 0.85
Ellagic acid	–
p-Coumaric acid (trans)	24.93 ± 0.27
p-Coumaric acid (cis)	90.03 ± 0.16
Flavan-3-ols	
Catechin	12.81 ± 3.13
Epicatechin	21.39 ± 5.33
Epigallocatechin gallate (EGCG)	4.32 ± 0.01
Epigallocatechin	183.14 ± 30.59
Flavonols	
Quercetin	10.09 ± 0.01
Kaempferol	8.13 ± 0.00
Total	3111.60 ± 32.41
FRAP* (mg Trolox/ L r. 2.5%)	580.61 ± 0.52
TPC (mg GAE/ L r. 2.5.%)	1810.67 ± 50.10

Explanatory notes:

Phenolic acids were additionally classified as hydroxybenzoic and hydroxycinnamic acid derivatives based on their chemical structures; FRAP – ferric reducing antioxidant power; TPC – total phenolic content; GAE – gallic acid equivalents

Table S4 .Antioxidant compounds in flours (mg/100 g).

Compound (mg/100 g)	WF	ChF	HF	BF
Phenolic acids				
3,4-Dihydroxybenzoic acid	–	1.99 ^c ± 0.00	2.77 ^b ± 0.97	3.73 ^a ± 0.02
Caffeic acid	–	1.81 ^b ± 0.00	1.79 ^b ± 0.07	2.61 ^a ± 0.00
Vanillic acid	3.26 ^d ± 0.00	3.82 ^c ± 0.00	3.92 ^b ± 0.01	4.02 ^a ± 0.03
Ferulic acid	1.37 ^c ± 0.00	1.74 ^b ± 0.00	2.09 ^a ± 0.01	2.07 ^a ± 0.03
Sinapic acid	1.06 ^c ± 0.01	160.05 ^a ± 0.57	2.09 ^b ± 0.02	1.07 ^c ± 0.02
p-Coumaric acid (trans)	1.70 ^c ± 0.01	1.73 ^c ± 0.02	2.35 ^a ± 0.03	1.87 ^b ± 0.00

p-Coumaric acid (cis)	1.55 ^c ± 0.01	1.51 ^c ± 0.01	1.99 ^b ± 0.00	2.36 ^a ± 0.04
Flavan-3-ols				
Catechin	–	2.92 ^b ± 0.04	0.25 ^c ± 0.02	8.59 ^a ± 0.45
Epicatechin	0.02 ^d ± 0.00	2.31 ^c ± 0.02	8.10 ^b ± 0.03	12.69 ^a ± 1.11
Epigallocatechin gallate	–	2.11 ^a ± 0.08	1.83 ^b ± 0.03	2.07 ^a ± 0.07
Epigallocatechin	–	–	–	20.49 ^a ± 2.64
Flavonols				
Quercetin	–	1.58 ^b ± 0.00	1.99 ^a ± 0.00	1.56 ^c ± 0.00
Kaempferol	–	6.61 ^b ± 0.00	6.67 ^a ± 0.00	–
Total	8.96 ^d ± 0.02	188.18 ^a ± 0.58	35.93 ^c ± 0.98	63.13 ^b ± 2.90
FRAP (mg trolox/ kg ^{−1})	1.67 ^c ± 0.04	101.91 ^a ± 0.15	33.01 ^b ± 1.31	33.44 ^b ± 0.09
TPC (mg GAE/kg ^{−1})	47.97 ^d ± 0.48	344.16 ^a ± 2.24	285.54 ^b ± 1.17	215.23 ^c ± 0.94

Explanatory notes:

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WF – wheat flour; ChF – chia flour; HF – hemp flour; BF – buckwheat flour; phenolic acids were additionally classified as hydroxybenzoic and hydroxycinnamic acid derivatives based on their chemical structures; different superscript letters within a row indicate significant differences at $p < 0.05$; FRAP – ferric reducing antioxidant power; TPC – total phenolic content; GAE – gallic acid equivalents

Table S5. Raw material composition of bread.

	Unit	WCh	WCh/Cis	WChH	WChH/Cis	WChB	WChB/Cis
% re- place- ment of WF				15	15	15	15
WF		975	975	825	825	825	825
ChF		25	25	25	25	25	25
HF	[g]	–	–	150	150	–	–
BF		–	–	–	–	150	150
Yeast		30	30	30	30	30	30
Salt		20	20	20	20	20	20
Water	[mL]	581	–	603	–	587	–
Cistus infusion		–	581	–	603	–	587

Explanatory notes:

WF – wheat flour; ChF – chia flour; HF – hemp flour; BF – buckwheat flour. Bread variants are defined in the Abbreviations section. Hemp flour (HF) and buckwheat flour (BF) were used as partial replacements of wheat flour at a level of 15% (w/w of total flour basis). Chia flour (ChF) was added at a constant level across all formulations.

Table S6. Gradient separation parameters.

Time [min]	Eluent A [%]
Method 1	
0	17
3	17
3.5	20
12	20
12.5	40
20	40
20.5	90
26.5	90
30	17
Method 2	
0	10
9	10
10	15
15	15
16	30
40	30
41	90
53	90
58	10

Table S7. Validation parameters for polyphenol analysis

Name	Wave length [nm]	LOD [$\mu\text{g/mL}$]	LOQ [$\mu\text{g/mL}$]	Parameters of calibration curve		R^2	concentration range [$\mu\text{g/g}$]
				a	b		
Gallic acid	270	5.17	15.67	10246.8	-20215.7	0.9988	16.5-124
3,4-Dihydroxybenzoic acid	260	2.32	7.04	41541.8	-32001	0.9999	21-210
Chlorogenic acid	320	2.25	6.83	22248.5	569289.5	0.9998	15-155
Caffeic acid	320	0.39	1.17	66314.7	-215347	0.9999	24.5-245
Vanillic acid	260	0.80	2.42	45186.5	-243482	0.9999	21-157.5
Ferulic acid	320	0.22	0.66	59093.8	-84609.4	0.9999	14-145
Sinapic acid	320	0.05	0.16	46873.1	-82248.7	1.0000	18-90
p-Coumaric acid (trans)	300	0.40	1.21	83195.4	-135441	0.9999	21-210
p-Coumaric acid (cis)	300	0.13	0.38	44844.7	-77901.9	1.0000	21.5-161
Catechin	275	0.96	2.89	4935.074	4492.5	0.9999	18-139
Epicatechin	275	1.56	4.74	5920.091	-5531.11	0.9999	16-160
Epigallocatechin gallate (EGCG)	275	0.32	0.97	12880.1	-101825	0.9999	20-150
Epigallocatechin	270	0.50	1.50	1766.8	4167.5	0.9999	17.5-175
Quercetin	370	0.94	2.86	44707.9	-48471.5	0.9999	16-160
Kaempferol	370	0.05	0.15	45803.8	-98714.7	1.0000	13-100