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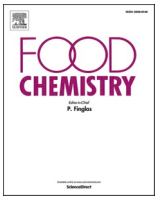

Corrigendum

Corrigendum to "Exploring the nutritional and health benefits of pulses from the Indian Himalayan region: A glimpse into the region's rich agricultural heritage" [Food Chem. 422 (2023) 136259]

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The authors regret the errors that appeared in their paper, "Exploring the nutritional and health benefits of pulses from the Indian Himalayan region: A glimpse into the region's rich agricultural heritage." The misrepresentation of data in our review was attributed to cross-reference papers, leading to poor citation due to errors already present in those sources (Venkidasamya et al. 2019; and Liu & Xu, 2016). Additionally, a few typographical errors occurred during the manuscript's revision process, which unfortunately went unnoticed during proofreading. This corrigendum is submitted seeking to address and rectify these issues appropriately.

- **Page no 2, first paragraph**: "lentils (7.3%)" should be modified to "5.38%".
- **Page no 2, second paragraph**: "Pest infestation" should be read as "insect infestation"
- **Page no 2, section 2, third paragraph**: Reference "Didinger et al. 2022" should be read as deleted.
- **Page no 4, subsection 3.1 should be replaced by the correct one**

"3.1 Protein

"Pulses are rich sources of proteins, which they typically contain in proportions from 21 to 25% (Tiwari and Singh, 2012). Kaur et al. (2013) determined the protein content of 20 rice bean cultivars grown in IHR and found it to range from 18.64 % in cultivar BC2 to 21% in LRB13. The protein content of Himalayan pulses per 100 g has been found to range from a minimum of 19.91 g in red kidney beans (Longvah et al., 2017) to a maximum of 35.58 g in black soybean (Longvah et al., 2017) (Table 1)."

- **Page no 4, subsection 3.2 should be replaced by the correct one**:

"3.2 Carbohydrates

Pulses contain large amounts of carbohydrates and starch in addition to protein. The carbohydrate content of Himalayan pulses ranges from a minimum of 30.35–31.85 g/100 g in black soybean (Patel and Pandya 2014) to a maximum of 77.54/100 g in rice bean (Baruah et al., 2018). Kaur et al. (2013) found the maximum and minimum amylose content of starch from 20 cultivars of rice bean grown in IHR to be 60.14 % in cultivar LRB417 and 21.19 % in RL3. Bravo et al. (1999) reported a maximum starch content of 36 g/100 g in horse gram and a minimum content of 5.55 g/100 g in black soybean (Pal et al., 2020), as well as a maximum content in total soluble sugars of 19.59 g/100 g in rice bean and a minimum one of 6.38 g/100 g in horse gram (Bravo et al., 1999; Pal et al., 2020) (Table 1)".

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- **Full reference for Bravo et al., (1999)** should be read as "Bravo, L., Siddhuraju, P., Saura-Calixto, F., 1999. Composition of underexploited Indian pulses: Comparison with common legumes. Food Chemistry, 64(2), 185–192."
- **Page no 4, subsection 3.3 should be replaced by the correct one**

"3.3 Energy

Pulses are a good source of energy, which they supply in sufficient amounts to meet human functional demands. In fact, Himalayan pulses typically provide 1252–1596 kJ/100 g. The energy supply per 100 g of pulse ranges from a maximum of 1596 kJ in black soybean to a minimum of 1252 kJ in red kidney beans (Longvah et al. 2017), with an intermediate value (1379 kJ) in horse gram (Longvah et al., 2017) (Table 1)."

- **Page no 4, subsection 3.5 should be replaced by the correct one**

"3.5 Ash

Ash is a mixture of minerals and other residues remaining after complete combustion of a substance or plant (Kaundal and Kumar, 2020). Ash contains a large number of minerals that are very useful for metabolism, growth and development. The ash content of Himalayan pulses ranges from 3.24 % in horse gram (Longvah et al. 2017) to 4.82 % in kidney bean (Roy et al. 2021), with an intermediate value of 3.34–3.80 % in rice beans (Bepary et al., 2017). Apparently, the ash content of kidney bean exceeds those of horse gram and rice bean".

- **Reference for Roy et al. (2021):** Roy, M., Imran, M. Z. H., Alam, M., & Rahman, M. (2021). Effect of boiling and roasting on physico-chemical and antioxidant properties of dark red kidney bean (*Phaseolus vulgaris*). Food Research, 5(3), 438–445.
- **Page no 4, Table 1: The corrected table should be read as:**

"**Table 1.** Contents in carbohydrates, fats, and other components of pulses per 100 g sample.

Contents	Horse Gram	Kidney Beans	Black Soybeans	Rice bean
Energy (kJ)	1379 (Longvah et al. 2017)	1252 (Longvah et al. 2017)	1596 (Longvah et al. 2017)	ND
Carbohydrates (g)	57.24 (Longvah et al. 2017)	48.61 (Longvah et al. 2017)	30.35–31.85 (Patel and Pandya 2014)	77.54 (Baruah et al. 2018)
Protein (g)	21.73 (Longvah et al. 2017)	19.91 (Longvah et al. 2017)	35.58 (Longvah et al. 2017)	29.09 (Baruah et al. 2018)
Fibres (g)	7.88 (Longvah et al. 2017)	16.57 (Longvah et al. 2017)	21.77–30.31 (Lin and Lai 2006)	5.53–6.56 (Bepary et al. 2017)
Starch (g)	36 (Bravo et al., 1999)	26.64 (Pal et al. 2020)	5.55 (Pal et al. 2020)	21.69 (Pal et al. 2020)
Total soluble sugars (TSS) (g)	6.38 (Bravo et al., 1999)	18.66 (Pal et al. 2020)	8.92 (Pal et al. 2020)	19.59 (Pal et al. 2020)
Total lipids (g)	1.65 (Pal et al. 2020)	1.63 (Pal et al. 2020)	7.30 (Pal et al. 2020)	1.20 (Pal et al. 2020)
SFA (g)	0.013 (Longvah et al. 2017)	19.67–23.80 (Khrisanapant et al. 2022)	ND	ND
MSFA (g)	0.006 (Longvah et al. 2017)	12.40–17.46 (Khrisanapant et al. 2022)	ND	ND
PSFA (g)	0.025 (Longvah et al. 2017)	57.89–67.38 (Khrisanapant et al. 2022)	ND	ND
Water (g)	9.28 (Longvah et al. 2017)	9.87 (Longvah et al. 2017)	ND	3.58 (Baruah et al. 2018)
Ash (%)	3.24 (Longvah et al. 2017)	4.82 (Roy et al. 2021)	ND	3.34–3.80 (Bepary et al. 2017)

ND: Not determined. SFA: Saturated fatty acid. MSFA: Mono saturated fatty acid. PUFA: Poly saturated fatty acid."

- **Reference for Khrisanapant et al. (2022)**: Khrisanapant, P., Kebede, B., Leong, S. Y., & Oey, I. (2022). Effects of hydrothermal processing on volatile and fatty acids profile of Cowpeas (*Vigna unguiculata*), Chickpeas (*Cicer arietinum*) and Kidney Beans (*Phaseolus vulgaris*). Molecules, 27(23), 8204.
- **Page no 5, Table 2: Corrected table should be read as:**

"**Table 2.** Vitamin contents of Himalayan pulses.

Vitamins (mg)	Horse Gram (mg/100 g edible portion) (Longvah et al. 2017)	Kidney Beans (mg/100g edible portion) (Longvah et al. 2017)	Black soybean (mg/Kg) (Kim et al. 2014)	Rice bean (mg/100g edible portion) (Katoch 2013; Longvah et al. 2017)
C	ND	ND	ND	21.26
B1	0.32	0.30	1.1–7.2	0.46
B2	0.24	0.19	1.2–1.6	0.14
B3	1.82	2.42	21.6–32.10	2.32
B5	1.58	1.82	6.6–23.80	0.98
B6	0.21	0.21	2.2–10.90	0.13
B9	0.16	0.31	ND	0.12

ND: Not determined."

- **Reference for "Kim et al. 2014" should be read as**: "Kim, G.P., Lee, J., Ahn, K.G., Hwang, Y.S., Choi, Y., Chun, J., Chang, W.S., Choung, M.G. (2014). Differential responses of B vitamins in black soybean seeds. Food Chemistry, 153:101–108. doi: 10.1016/j.foodchem.2013.12.047.
- **Page no 5, Table 3: Corrected table should be read as**

"**Table 3.** Amino acid contents (mg/100 g) of Himalayan pulses.

Amino acids	Horse Gram (Longvah et al. 2017)	Kidney Beans (Audu and Aremu 2011)	Black Soybeans (Xiao et al. 2021)	Rice bean (Katoch 2013)
Tryptophan	1.08	ND	ND	1.23–2.0
Threonine	3.32	3.4	15.80	4.23–5.12
Isoleucine	3.72	3.7	18.70	6.56–7.60
Leucine	6.79	7.2	31.87	7.23–8.74
Lysine	6.24	7.0	25.64	7.23–8.75
Methionine	0.73	1.7	3.55	2.09–2.63
Cystine	0.75	1.2	5.53	ND
Phenylalanine	8.08	4.6	20.81	4.94–5.92
Tyrosine	3.18	3.1	14.59	ND
Valine	4.16	4.1	19.46	5.20–5.89
Arginine	5.87	6.9	33.68	ND
Histidine	2.70	3.0	12.18	2.11–2.98
Alanine	4.60	4.4	16.85	ND
Aspartic Acid	11.24	9.5	47.29	ND
Glutamic Acid	18.54	10.2	80.43	ND
Glycine	4.03	5.2	17.34	ND
Proline	3.72	3.3	20.21	ND
Serine	5.19	3.1	20.19	ND

ND: Not determined."

those in non-essential amino acids reportedly range from 0.75 to 18.54 mg in horse gram (Longvah et al. 2017), 1.2 to 10.2 mg in red kidney bean (Audu and Aremu, 2011) and 5.53 to 80.43 in black soybean (Xiao et al., 2021) (Table 3)."

- **Page 5, subsection 3.8, second paragraph should be read as:**

"Rice bean (*Vigna umbellata*) has the highest contents in the previous nutrients, when compared with kidney bean (*Phaseolus vulgaris*), black soybean (*Glycine max*) and horse gram (*Macrotyloma uniflorum*). Macronutrient contents per 100 g range from 12.14 to 1065 mg in horse gram (Longvah et al. 2017), 1.35 to 1272 mg in kidney bean (Longvah et al. 2017), 2.07 to 1613 mg in black soybean (Longvah et al. 2017) and 234 to 327 mg in rice bean (Kaur & Kapoor, 1992). On the other hand, micronutrient contents per 100 g range from 1.29 to 29.49 mg in horse gram (Longvah et al. 2017), 1.03 to 32.55 mg in kidney bean (Longvah et al. 2017), 1.29 to 19 mg in black soybean (Longvah et al. 2017) and 1.2 to 7.7 mg in rice bean (Kaur & Kapoor, 1992) (Table 4)".

- **Page no 6, Table 4: Correct table should be read as**

"**Table 4.** Mineral and protein content of pulses (per 100 g of sample).

Minerals (mg/100 g)	Horse gram (Longvah et al. 2017)	Kidney bean (Longvah et al. 2017)	Black soybean (Longvah et al. 2017)	Rice bean (Kaur and Kapoor 1992)	Rice bean (Saikia et al. 1999)	Rice bean (Katoch 2013)
Ca	269	78.16	239	287–327	220–325	189–598
Fe	8.76	4.50	8.29	6.3–7.7	3.0–7.0	6.89–9.25
Mg	152	197	259	ND	ND	299–369
P	298	457	483	234–249	116–275	153–566
K	1065	1272	1613	ND	140–210	1452–1752
Na	12.14	1.35	2.07	ND	40–52	276–352
Zn	2.71	2.42	4.01	2.8–3.2	ND	2.45–3.56
Cu	1.29	1.03	1.29	1.2–1.8	ND	3.56–4.97
Mn	3.13	2.38	2.69	1.9–3.5	ND	4.56–7.45
Se	29.49	32.55	19	ND	ND	ND
Proteins (g)	21.7	19.91	35.58	ND	ND	23.17–25.57

- **Page 5, subsection 3.7, should be read as:**

"3.7. Amino acids

Amino acids are basic unit of proteins that contain an amino group (—NH_2) and a carboxylic group (—COOH). These compounds regulate a number of biological functions associated to gene expression, translation and protein synthesis (Akram et al., 2011). Nutritionists classify amino acids as non-essential and essential according to whether or not they are synthesized by cells. Pulses contain both essential and non-essential amino acids. Some, such as methionine, cysteine and tryptophan, are present in small amounts (Tiwari and Singh, 2012). The contents per 100 g in essential amino acids have been found to range from 0.73 to 8.08 mg in horse gram (Longvah et al. 2017), 1.7 to 7.2 mg in kidney bean (Audu and Aremu, 2011), 3.55 to 33.68 mg in black soybean (Xiao et al., 2021) and 1.23 to 8.75 mg in rice bean (Katoch, 2013). Likewise,

ND: Not determined."

- **Table 4: Full reference for "Saikia et al. 1999" should be read as** "Saikia, P., Sarkar, C. R., & Borua, I. (1999). Chemical composition, antinutritional factors and effect of cooking on nutritional quality of rice bean [*Vigna umbellata* (Thunb; Ohwi and Ohashi)]. Food Chemistry, 67(4), 347–352. doi:10.1016/s0308-8146(98)00206-4."
- **Page no 6, subsection 4.1, last paragraph**: "Amarowicz & Pegg (2008), and Zhang et al. (2015)" should be modified to "Zhao et al. (2014)".
- **Page no 8, subsection 4.3, second paragraph, last line**: "(Nie et al. 2019)" should be read as "deleted"
- **Page no 9, subsection 4.6, second paragraph**: "IL-1" should be read as "IL-1β".

- **Page no 9, subsection 4.8, first paragraph should be read as:** "Himalayan pulses have proved effective against harmful microorganisms. A study by Hori et al. (2006) on green, red, black and white Adzuki beans using distilled water as solvent revealed that the green, black, and red variety moderately inhibited the growth of all 8 bacterial species examined. However, the white variety does not show any antibacterial activity."
- **Full reference for Hori et al. 2006**: "Hori, Y., Sato, S., & Hatai, A. (2006). Antibacterial activity of plant extracts from azuki beans (*Vigna angularis*) in vitro. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives, 20(2), 162–164".
- **Page no 11, Table 5: Reference** "Baig et al. (2018)" should be read as "Salma et al. (2018)"
- **Full Reference for Salma et al. (2018):** "Salma., Baig, S. G., Hasan, M. M., Ahmed, S., & Fatima, S. A. (2018). Analgesic and anti-inflammatory effects of *Phaseolus vulgaris* L. fixed oil in rodents. Journal of Basic & Applied Sciences, 14, 174–179.
- **Page no 12, Table 6, References**: "Vinutha et al. 2022; and Kim, Pichiah, Kim and Cha, 2017" should be read as "Shi 2015"
- **Page no 12, section 5, second paragraph, wrong value** "59.62%" should be read as "59.26%".
- **Page no 12, section 5, third paragraph: wrong value** "17.1" should be read as "deleted".