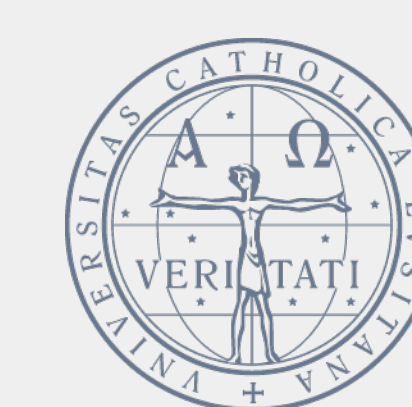


Lentil (*Lens culinaris L.*) intraspecific nutritional variability and development of a lentil-based snack

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Introduction

Legumes, such as lentils (*Lens culinaris L.*) are among the oldest crops cultivated by humans. They provide essential minerals for human health and are excellent sources of protein/amino acids, fatty acids, fibers, carbohydrates, and phytochemicals, such as polyphenols. Lentils, compared with other pulses, also have faster preparation time, low phytic acid content, and a high arginine and total phenolic content of antioxidant flavonoids. Besides, their low glycemic index helps avoid peaks in blood glucose, improving metabolic control. Thus, considering this solid evidence of health benefits of lentils, they may help support a global shift toward sustainable diets and consequent commercial valorization.

Material and methods

- ✓ *Lens culinaris L.* genotypes: “Kermit” (LK), “Brown” (LB), “Green” (LG), and “Red” (LR);
- ✓ Determination of lentil mineral concentration;
- ✓ Assessment of protein percentage in lentil;
- ✓ Development of a lentil-based snack;
- ✓ Statistical analysis: mean comparisons were made through ANOVA with the GraphPad program.



Results and discussion

Table 1 – Mineral concentration of *Lens culinaris L.* genotypes: “Kermit” (LK), “Brown” (LB), “Green” (LG), and “Red” (LR). Each value represents the mean \pm SEM. Different letters represent statistically different means at $p < 0.05$.

	LK	LB	LG	LR
Potassium (K) mg.g⁻¹	10.52 \pm 0.04 ^{ab}	9.44 \pm 0.02 ^b	11.92 \pm 0.41 ^a	11.94 \pm 0.02 ^a
Phosphorus (P) mg.g⁻¹	3.89 \pm 0.04	4.71 \pm 0.03	5.78 \pm 0.13	5.56 \pm 0.08
Magnesium (Mg) mg.g⁻¹	1.35 \pm 0.03	1.31 \pm 0.02	1.51 \pm 0.06	1.10 \pm 0.03
Calcium (Ca) mg.g⁻¹	0.70 \pm 0.01	0.93 \pm 0.01	0.80 \pm 0.02	0.35 \pm 0.00
Iron (Fe) μg.g⁻¹	82.96 \pm 1.64 ^b	100.91 \pm 2.01 ^a	102.22 \pm 2.06 ^a	75.19 \pm 0.98 ^c
Zinc (Zn) μg.g⁻¹	43.42 \pm 0.12 ^d	64.99 \pm 0.14 ^a	52.03 \pm 0.78 ^c	60.63 \pm 0.88 ^b
Manganese (Mn) μg.g⁻¹	12.12 \pm 0.17 ^b	16.87 \pm 0.12 ^a	17.15 \pm 0.28 ^a	15.11 \pm 0.11 ^a

MINERAL PROFILE

There are no significant differences in macrominerals P, Mg, and Ca between genotypes. However, K is more present in LG and LR varieties. Contrastingly, the concentration of microminerals varies more significantly between them. LG has a higher concentration in Fe and Mn while LB in Zn.

Several tests were performed to optimize the muffin formulation with different amounts of lentil flour (100, 50, and 25%) mixed with oatmeal flour. The best was obtained with 50% of each flour.

LENTIL-BASED SNACK



Muffins made with lentil/oatmeal flour (left) and oatmeal flour (placebo; right).

PROTEIN CONTENT

The percentage of protein varies between the different genotypes. LB is the one with the highest protein percentage. However, all varieties present values of around 20%.

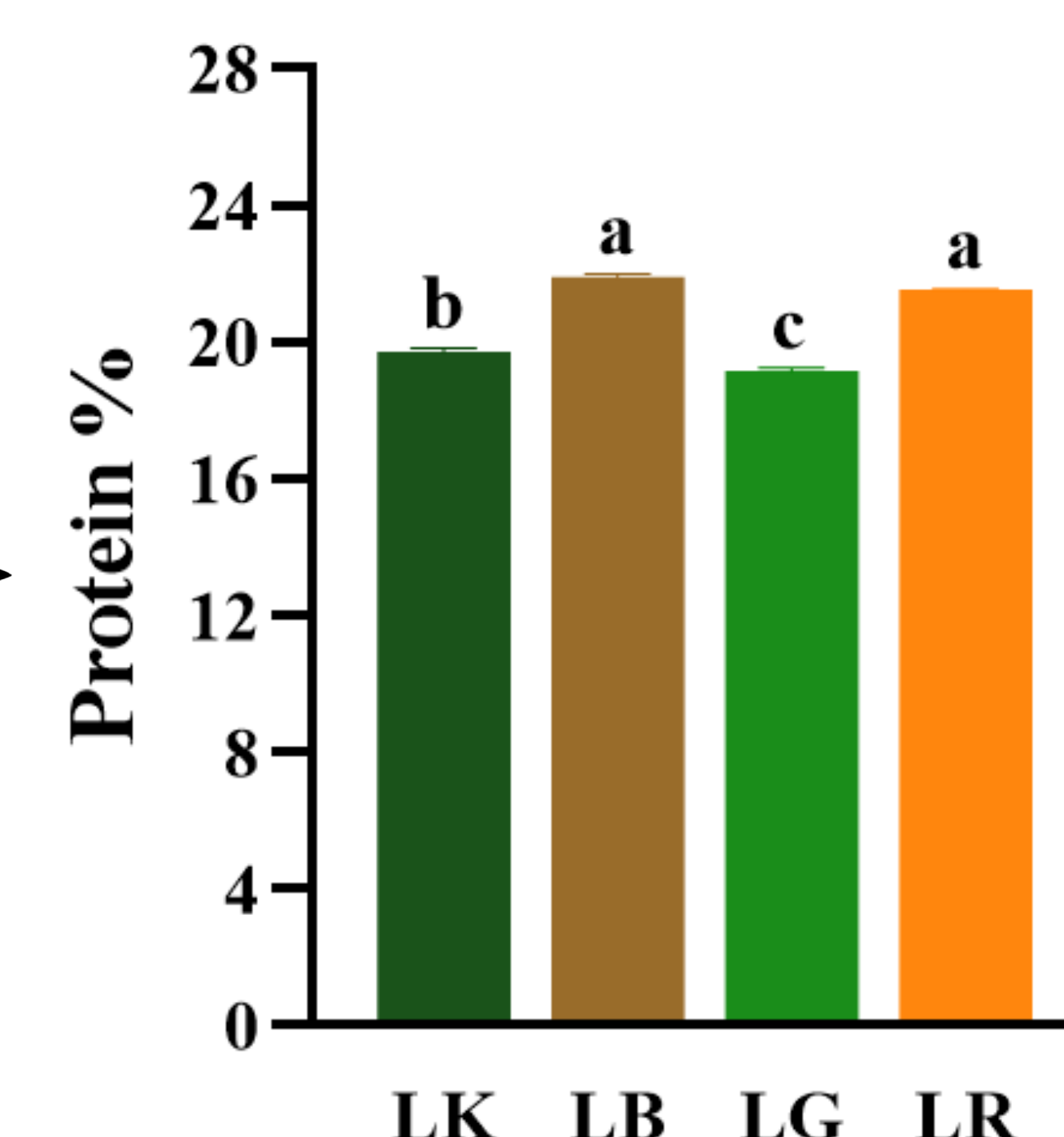


Figure 1 – Percentage of protein of *Lens culinaris L.* genotypes: “Kermit” (LK), “Brown” (LB), “Green” (LG), and “Red” (LR). Each value represents the mean \pm SEM. Different letters represent statistically different means at $p < 0.05$.

Conclusions

- ☞ Lentils are a good source of minerals, with the LG variety being the one with slightly higher concentration in some of them (K, P, Mg, Fe, Mn);
- ☞ All lentil genotypes have a protein percentage between 19-22%, which makes them an excellent alternative protein source;
- ☞ In a way to incorporate these lentil benefits into the human diet, we developed a snack in which commercial oatmeal flour was partially substituted with lentil flour, promoting the use of this legume grain.

Future perspectives

- ➔ Determination of amino acids concentration;
- ➔ Assessment of the nutritional value of the lentil-based snack and make a quantitative blind effective test to understand its acceptability;
- ➔ Test, in human trials, the consumption of the lentil snack on body composition and cardiovascular/metabolic risk factors.

Acknowledgements

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