

## An assessment of the chemical composition and physical parameters of *Phaseolus vulgaris* and *Phaseolus lunatus* beans

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### INTRODUCTION & AIM

European market shows potential for common dry beans and their products. Consumers are interested<sup>1</sup> in:

- **ecologically grown plant based products,**
- **high in protein and fiber,**
- **free from preservatives or additives,**
- **product suitability for health state e.g. gluten free.**

The aim of the study was to evaluate the physical-chemical parameters of four colorful beans :

✓ *Phaseolus vulgaris* (red speckled beans, red kidney beans, orange beans)

✓ *Phaseolus lunatus* (white color)

grown in Latvia, harvested in 2022, with an assessment of their future in **pasta production**.

White common beans from the local market as a control sample were analyzed.

### METHOD

**For chemical parameter determination used:**

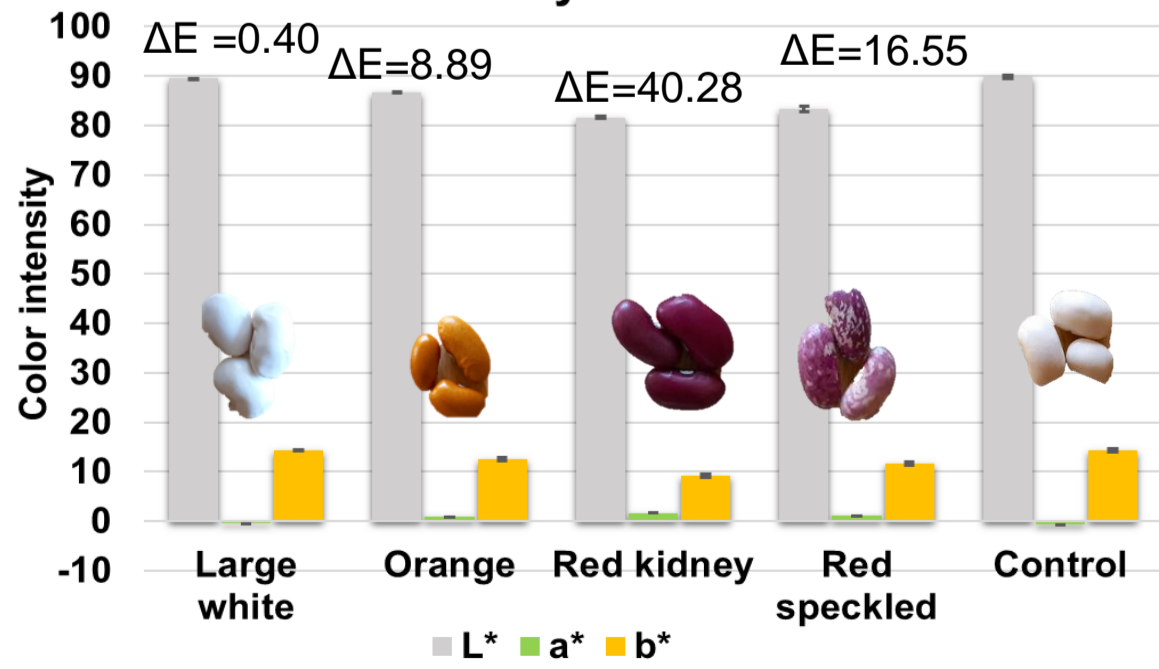
- Kjeldal method for protein determination;
- ISO 6492 for lipid;
- AOAC 985.29 for total dietary fiber (TDF);
- ISO 2171:2007 for ash;
- ICC Standard No 110/1 for moisture;
- calculation for carbohydrates (CHO);
- Energetic value calculated using conversion factors according to (EU) No 1169/2011

**For physical parameter determination used:**

- ISO 520:2010 for 1000 seed weight;
- LVS 275 for bulk density;
- CIE L\*a\*b\* system for color analysis using; calculated total color difference ( $\Delta E > 2$ , significant difference  $p < 0.05$ )

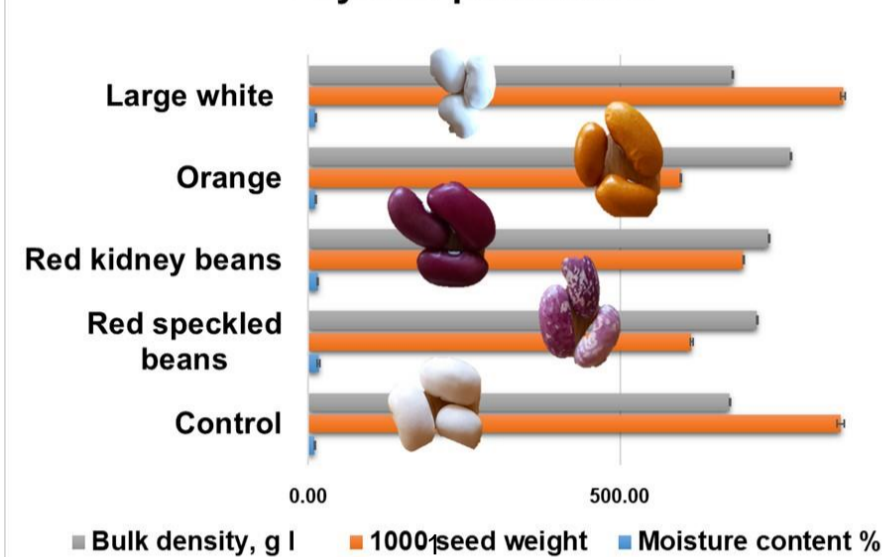
### RESULTS & DISCUSSION

#### Color analysis results



L\* stands for color intensity, on a scale of 0-100; 0-denotes black/dark, 100-white/light; a\* (red(+)/green(-)), b\* (yellow(+)/blue(-))

#### Physical parameters



The mass of 1000 grains depends on the moisture during the formation and maturation time. Varieties with harder and heavier grains have a higher bulk density.

#### Chemical composition

|                     | Protein %               | Lipids %                | TDF 100 g <sup>-1</sup>  | CHO %                    | Ash %                  | kcal   |
|---------------------|-------------------------|-------------------------|--------------------------|--------------------------|------------------------|--------|
| <b>Large white</b>  | 20.86±0.53 <sup>c</sup> | 1.94±0.04 <sup>b</sup>  | 37.99±0.54 <sup>a</sup>  | 60.82±0.61 <sup>bc</sup> | 4.96±0.05 <sup>a</sup> | 420.55 |
| <b>Orange</b>       | 21.08±0.95 <sup>c</sup> | 1.25±0.14 <sup>cd</sup> | 23.69±2.24 <sup>ab</sup> | 61.76±0.06 <sup>b</sup>  | 3.94±0.01 <sup>a</sup> | 391.30 |
| <b>Red kidney</b>   | 24.36±0.56 <sup>a</sup> | 0.88±0.08 <sup>d</sup>  | 14.28±1.23 <sup>c</sup>  | 54.97±0.31 <sup>c</sup>  | 4.60±0.07 <sup>a</sup> | 354.47 |
| <b>Red speckled</b> | 22.88±0.15 <sup>b</sup> | 1.09±0.07 <sup>c</sup>  | 13.11±2.55 <sup>c</sup>  | 54.67±2.25 <sup>c</sup>  | 4.52±0.09 <sup>a</sup> | 346.84 |
| <b>Control</b>      | 20.66±0.41 <sup>c</sup> | 2.06±0.01 <sup>a</sup>  | 21.68±1.36 <sup>b</sup>  | 62.48±0.24 <sup>a</sup>  | 4.97±0.21 <sup>a</sup> | 394.60 |

\* different letters for each bean type represent significant differences between values ( $P < 0.05$ )

Data in literature shows that, the brighter the white, the higher the total fiber content and ash content. Results of TDF in the large white beans is significantly higher than in the other analyzed samples, and the color of the seed coat is the brightest.

### CONCLUSION

*Phaseolus lunatus* appears to be a potentially more economically viable raw material for the production of new products.

*Phaseolus vulgaris* has a high protein content and potential for antiradical activity due to the color of the seed coats.

Overall, obtained data confirm that common beans grown in Latvia are a potential, biologically valuable and colorful raw material for healthy pasta production.

### FUTURE WORK / REFERENCES

- (1)The European market potential for common dry beans Assessed: 09/11/2023 Available: <https://www.cbi.eu/market-information/grains-pulses-oilseeds/dried-beans/market-potential>
- (2) Rivera et al. (2018) The Spanish Core Collection of Common Beans (*Phaseolus vulgaris* L.): An Important Source of Variability for Breeding Chemical Composition. *Front. Plant Sci.* 9:1642. doi: 10.3389/fpls.2018.01642

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