

# Diversity of Portuguese Common Bean Germplasm Across Regional Origins

Jacinta Santos<sup>1</sup>, Madalena Vaz<sup>2</sup>, Sara Pereira<sup>1</sup>, Joana Machado<sup>1</sup>, Marta W. Vasconcelos<sup>1</sup>, Ana Maria Barata<sup>2</sup>, Maria da Graça Pereira<sup>3</sup>, Carla S. Santos<sup>1\*</sup>

\*cssantos@ucp.pt

<sup>1</sup>Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal; <sup>2</sup>Instituto Nacional de Investigação Agrária e Veterinária, I. P., Banco Português de Germoplasma Vegetal, Quinta de S. José, S. Pedro de Merelim, 4700-859 Braga, Portugal; <sup>3</sup>Instituto Nacional de Investigação Agrária e Veterinária, I. P., Estação Nacional de Melhoramento de Plantas, Estrada de Gil Vaz, Apartado 6, 7351-901 Elvas, Portugal



CATOLICA

CBQF · CENTRE FOR BIOTECHNOLOGY AND FINE CHEMISTRY ASSOCIATE LABORATORY

CBQF

PORTO

## Introduction



Common bean (*Phaseolus vulgaris*) is the most consumed legume in Portugal (3.1 kg/per capita/year in 2025, INE, 2026)

Accounts for 20 – 28% of protein intake but also of micronutrients and bioactive compounds, although its benefits in health are poorly described for Portuguese accessions



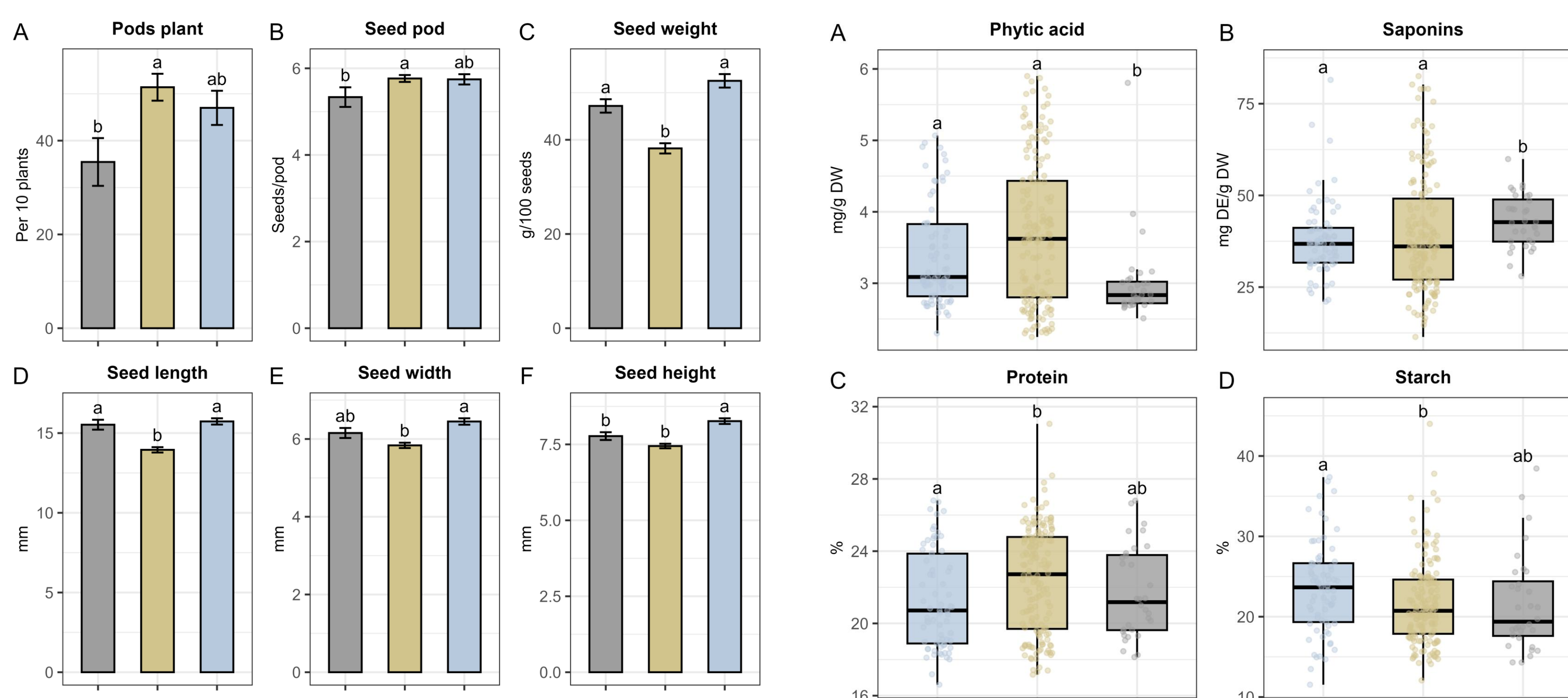
Portuguese germplasm includes ~1,405 landraces but only a few are commercially grown

Represent valuable genetic resources for climate resilience and sustainable agriculture



This work aimed to characterise the morphological, micronutrients, nutritional and bioactive profiles of Portuguese common bean accessions and assess the influence of regional origin on the profiles, revealing diversity patterns and supporting the selection of high-quality germplasm to promote its conservation, consumption and cultivation.

## Results and Discussion



Different letters indicate significant differences (Kruskal-Wallis + Dunn,  $p < 0.05$ )

### Seed morphology

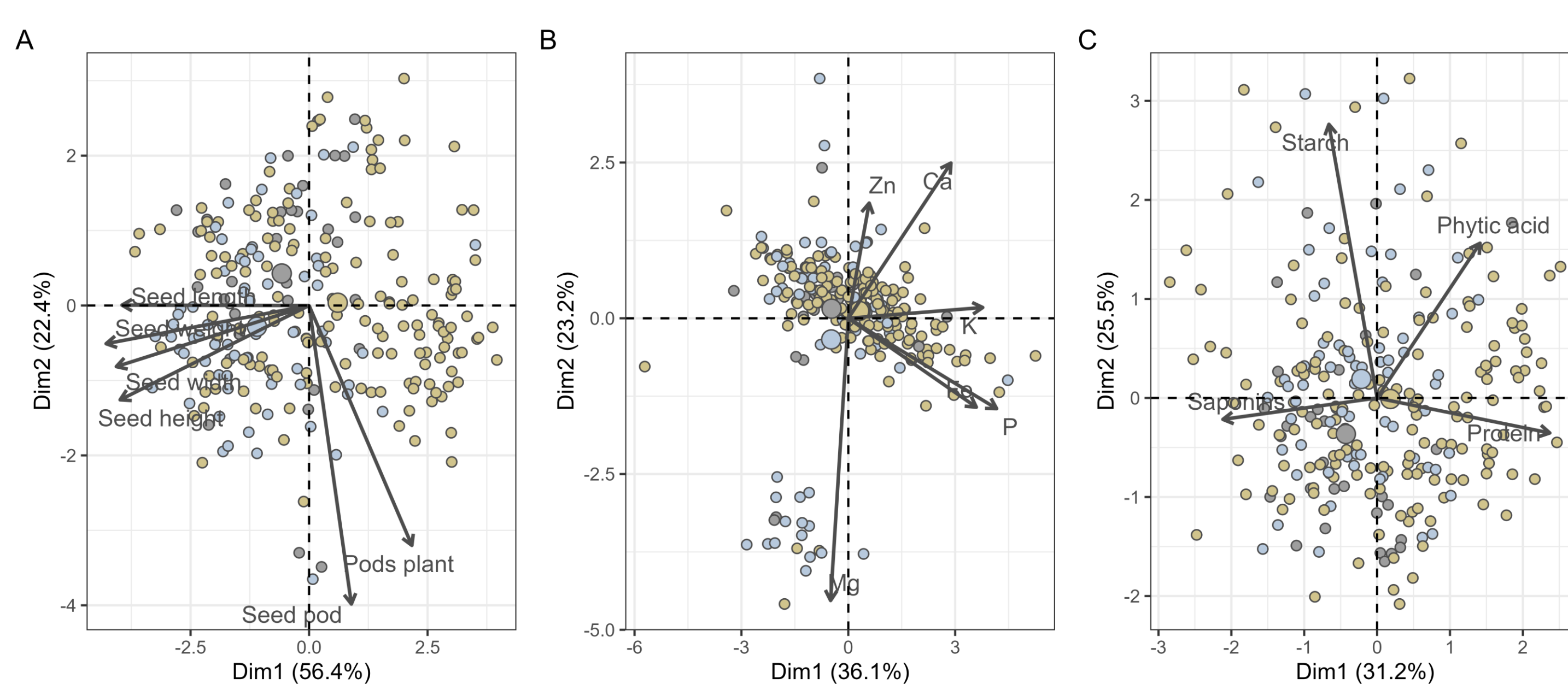
Northern accessions produced  $\sim 6 \pm 1$  seeds per pod, more than the other regions

Centre accessions have wider ( $6.5 \pm 0.7$  mm) and significant higher ( $8.3 \pm 0.8$  mm) seeds

### Nutritional, bioactive and antinutritional compounds

Northern seeds showed higher protein ( $22.4 \pm 2.9$  %) and phytic acid ( $3.7 \pm 1.01$  mg/g DW) content

Southern accessions present significant higher saponins content ( $43.0 \pm 7.3$  mg DE/g DW) and lower starch ( $21.6 \pm 6.0$  %) and phytic acid ( $3.0 \pm 0.6$  mg/g DW)



### Seed morphological, micronutrients, nutritional, bioactive and antinutritional compounds

Morphology contrasts seed size with reproductive traits

Micronutrients profile separates calcium from potassium and phosphorus, with strongest variance from magnesium

Protein and phytic acid are opposite to saponins, with starch as main influencer, indicating more variation towards storage compounds and energy

## Methods

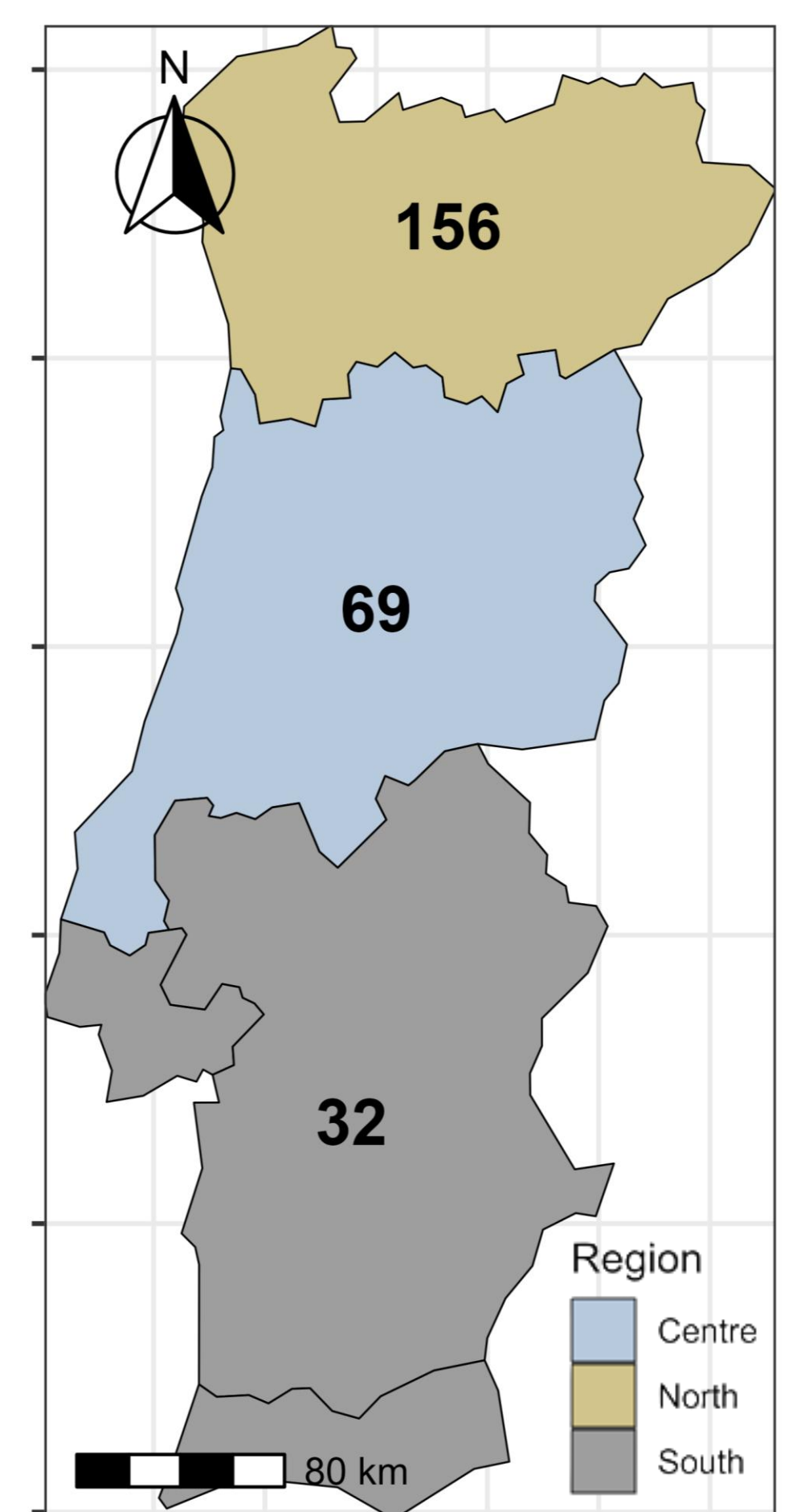
257 Portuguese common bean accession from the Northern, Centre and Southern regions

Common bean seeds were screened for:

- **Morphology** (pod per seed, seed per pod, seed weight, height, width, length)

And milled for the analysis of:

- **Micronutrients** (calcium, phosphorus, magnesium, zinc, iron, potassium, copper)
- **Nutritional and antinutritional compounds** (protein and starch), **bioactive and antinutritional compounds** (phytic acid and saponin)



## Conclusion



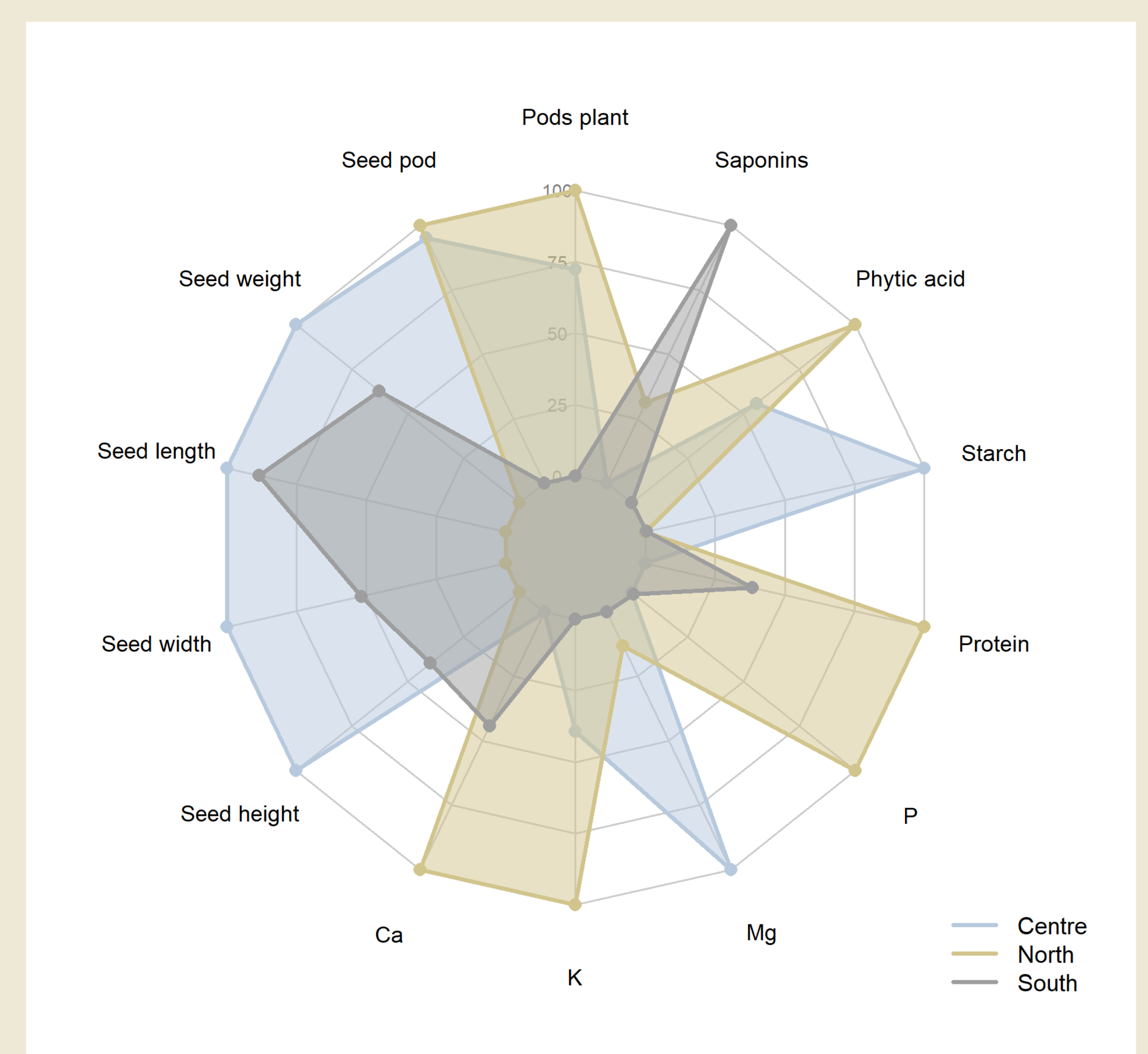
Northern accessions have **higher total number of seeds** but these are **smaller**, possibly due to more allocation of nutrients and energy to reproduction



Centre accessions show **bigger seeds with constant nutritional content**



Southern accessions are potentially more stress tolerant, showing **high saponin content and low starch and phytic acid**, investing more in survival and protection via metabolic pathways



## Acknowledgements

This work was supported by project LAND [grant 10.54499/2022.06252.PTDC; <https://doi.org/10.54499/2022.06252.PTDC>], and under contracts no. 2023.15056.TENURE.039 and no. 2023.15056.TENURE.060, funded by national funds through FCT – Fundação para a Ciência e Tecnologia, I.P. This work is also funded by national funds through the FCT, under UID/50016/2025 and LA/P/0076/2020 (<https://doi.org/10.54499/LA/P/0076/2020>).

