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Multivariate Analysis of the Morphological and Nutritional Diversity in Portuguese Common Bean (Phaseolus vulgaris L.)

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Introduction

Common bean (Phaseolus vulgaris L.) is a staple legume in Portugal, yet its diverse local germplasm remains underexploited in breeding programs. Despite the recognised importance of grain nutritional composition in determining food quality, it has often been overlooked in conventional selection processes. Given the growing global population and the urgent need to ensure food and nutrition security, the production of nutritionally superior grains must become a priority. The evaluated collection includes accessions representing different geographical regions of Portugal capturing a wide range of edaphoclimatic conditions and allowing exploration of their impact on seed quality.

The main objective was to assess variability and identify promising accessions for **crop improvement and valorisation.**

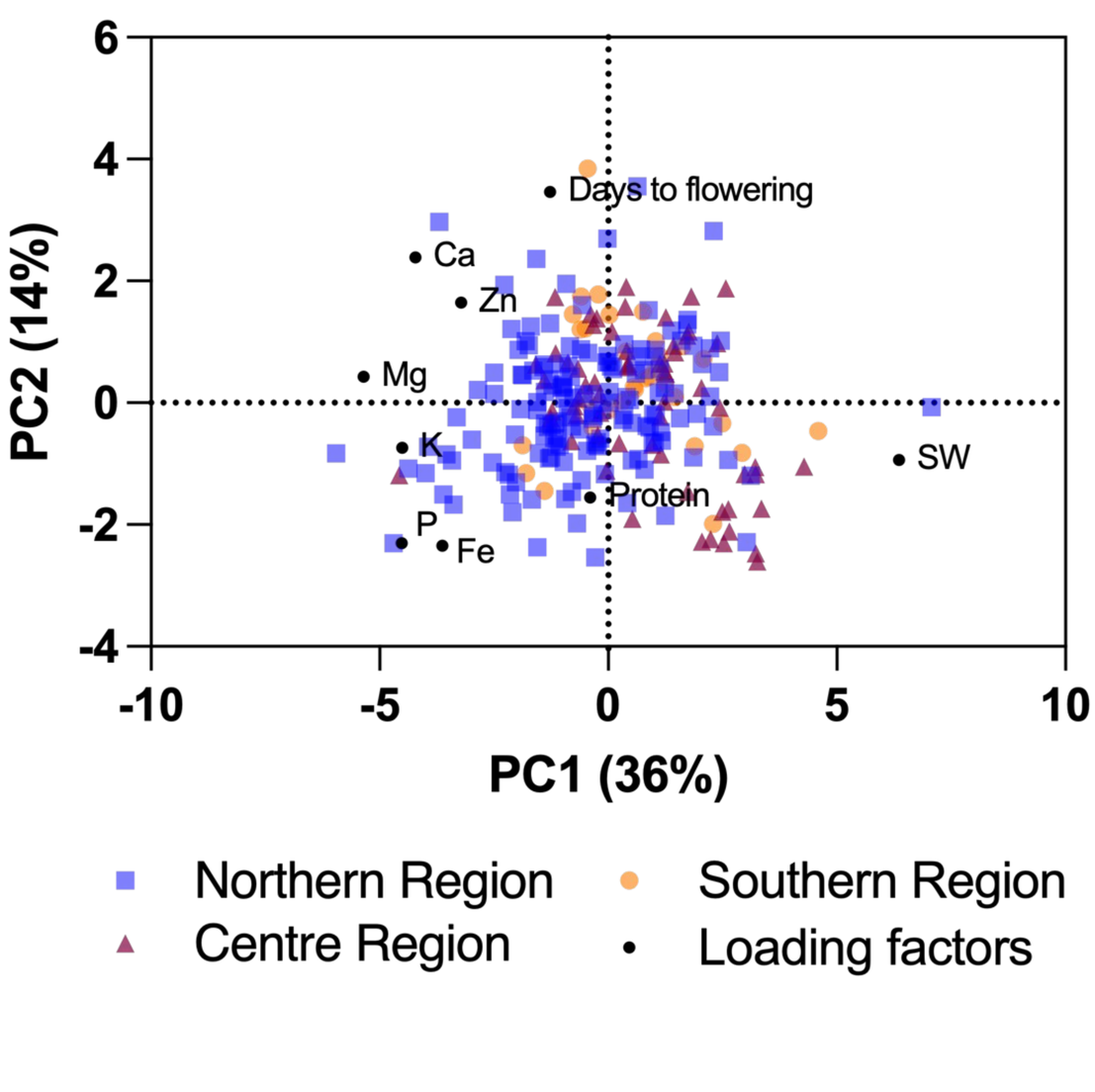
Methodology

A Portuguese collection of 250 accessions was evaluated for morphological descriptors and nutritional profiles. Key traits analysed included:

- Seed Weight (SW);
- Days to Flowering;
- Protein Content;
- Mineral Composition - calcium (Ca), magnesium (Mg), zinc (Zn), phosphorous (P), potassium (K), iron (Fe)

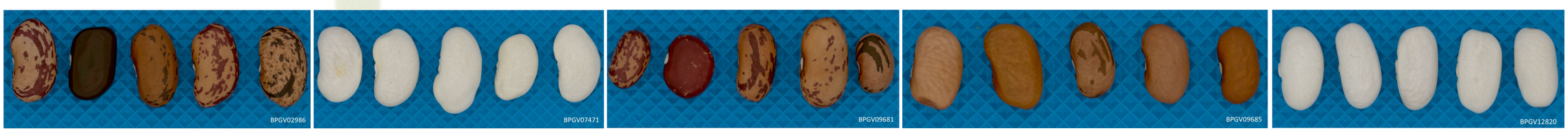
Results & Discussion

🌱 Principal Component Analysis (PCA) showed that the first two components accounted for 50% of the total variance, with PC1 (36%) primarily associated with **seed weight, days to flowering and protein content**, and PC2 (14%) reflected variation in **mineral composition**.



🌱 Regional clustering patterns were observed - Northern accessions tended to exhibit higher protein levels, while Southern ones showed greater mineral diversity.

🌱 Some accessions can be highlighted as they are outstanding from the collection, for their nutritional content and agronomic performance:



Conclusion

The observed intra-specific variability in Portuguese common bean germplasm offers valuable genetic resources for breeding, supporting sustainable agriculture, improved nutritional quality, and the promotion of neglected legumes for healthier diets.

Acknowledgments

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