



Extraction and functionality of soluble proteins from perennial ryegrass leaves

Sara Pérez-Vila^{1,3}, Mark A. Fenelon¹, Deirdre Hennesy², James A. O'Mahony³, Laura G. Gómez-Mascaraque¹

¹Teagasc Food Research Centre, Moorepark, Fermoy, Co. Cork, Ireland;

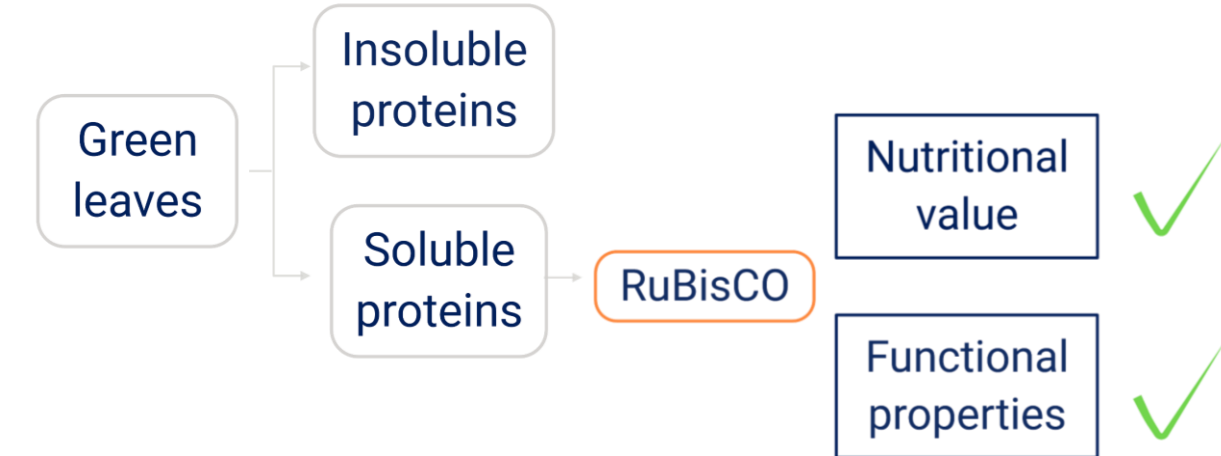
²Teagasc, Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork, Ireland;

³School of Food and Nutritional Sciences, University College Cork, Cork, Ireland



Introduction

Green leaves are a novel sources of proteins for food applications.

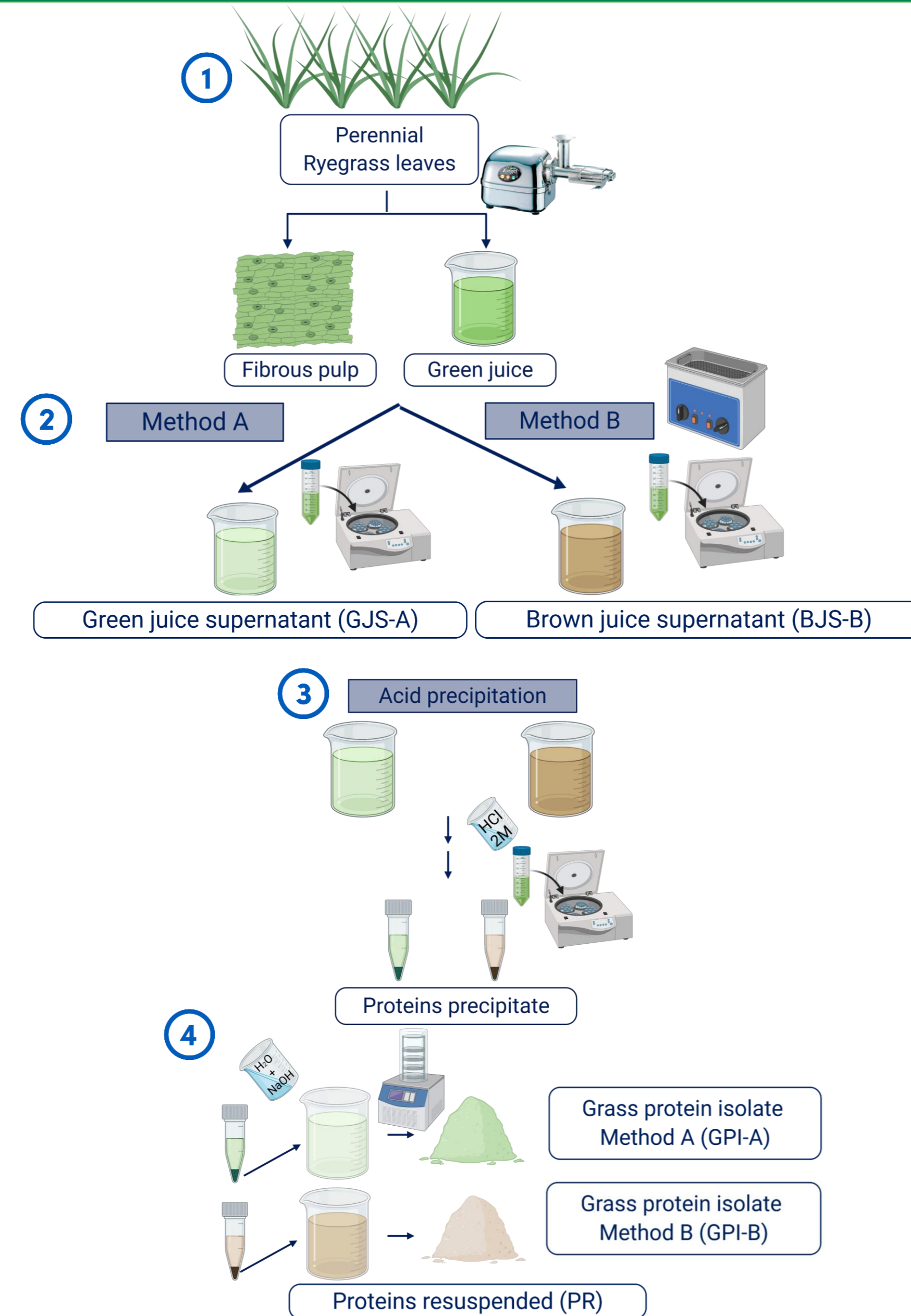


RuBisCO is the most abundant protein in nature.

Perennial ryegrass is an endogenous crop, minimizing environmental impact of transportation, comparing with other plant proteins such as soya.

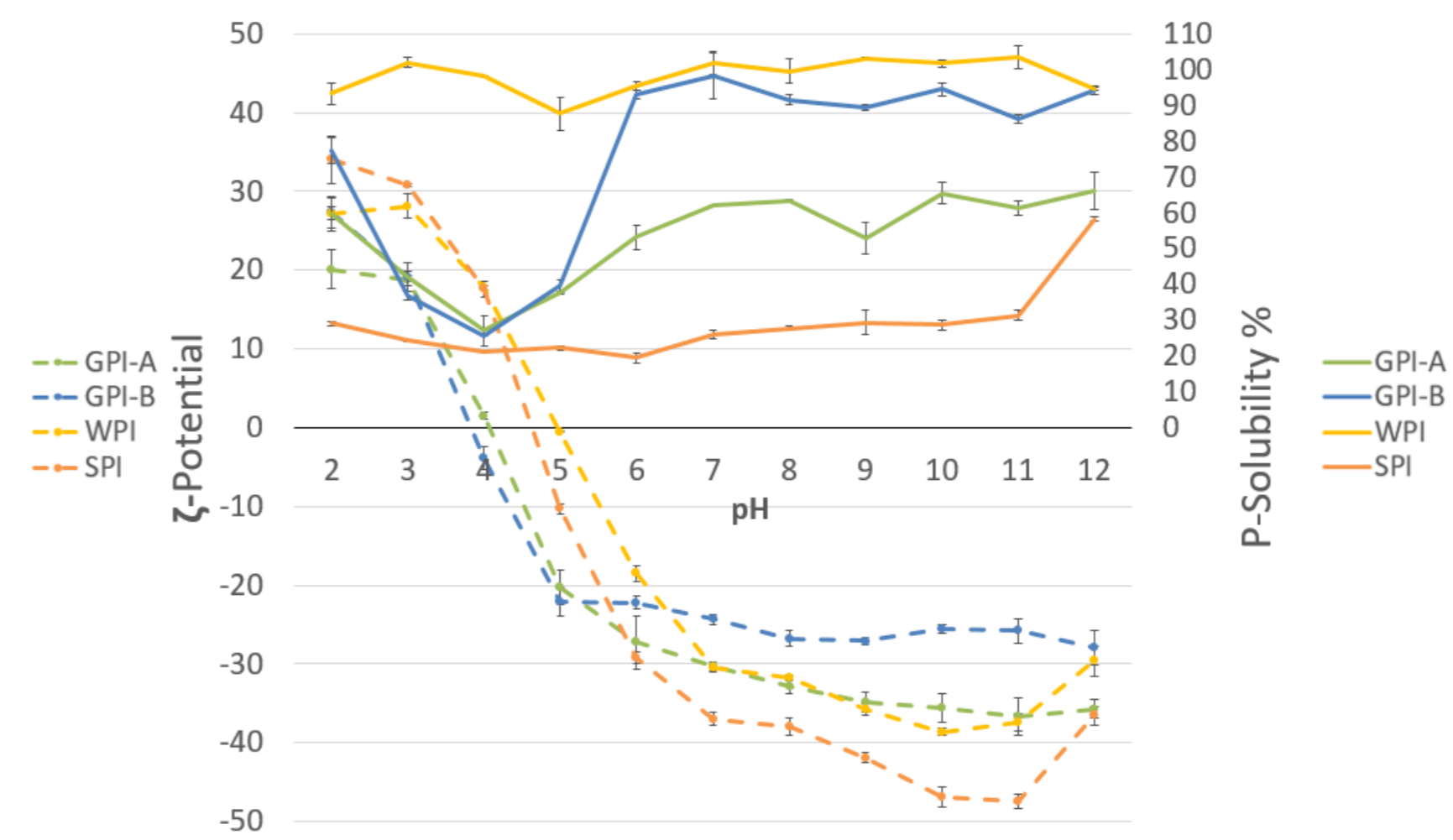
Experimental design

- Pressing of perennial ryegrass leaves to obtain green juice and remove fibrous pulp.
- Soluble protein separation from residual debris, two methods evaluated:
 - Method A:** Green juice centrifuged at 15,000 g for 30 min, to remove insoluble cell debris. Aim: to obtain a higher yield (although incomplete removal of chlorophyll).
 - Method B:** Green juice heated at 50 °C for 30 min before centrifugation, to enhance separation of chloroplast residues. Aim: to obtain a higher protein enrichment (but lower yield)
- Protein fraction concentrated by acid precipitation at pH 3.5 and centrifugation.
- Protein precipitate was re-suspended, adjusted to pH 7 and freeze-dried.

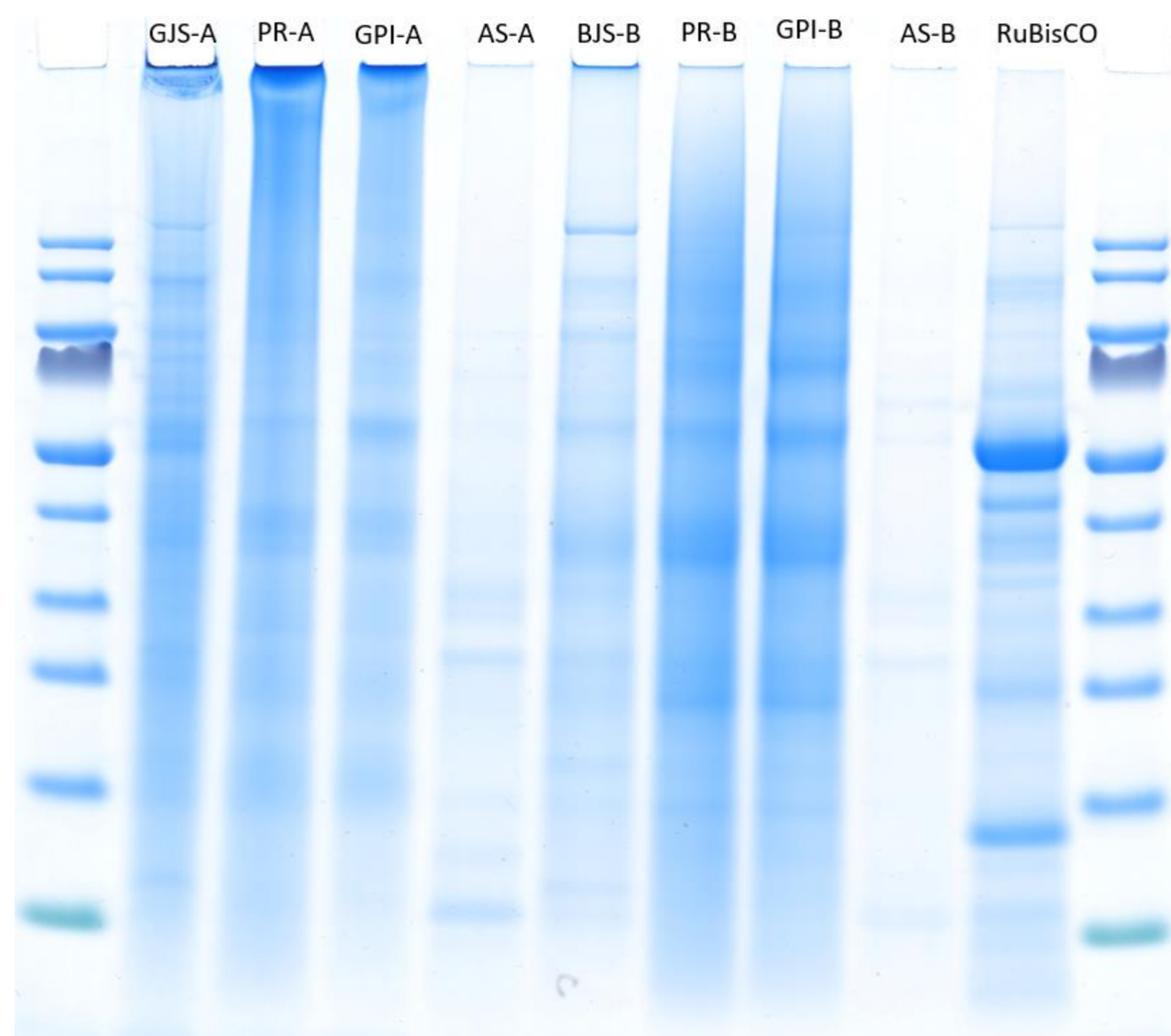


	Method A	Method B
Protein (%)	60.01 ± 3.00	63.06 ± 0.722
Solids (DM) (%)	89.87 ± 0.01	83.37 ± 0.18
Protein in DM (%)	66.77 ± 3.59	75.57 ± 0.91
Chlorophyll (mg/g)	6.61 ± 1.77	0.225 ± 0.101
Polyphenols (g GA/100g)	12.17 ± 1.67	15.99 ± 1.29
Ash (%)	3.71 ± 0.03	12.56 ± 0.63
Yield (% of Protein)	13.11 ± 0.93	1.45 ± 0.02

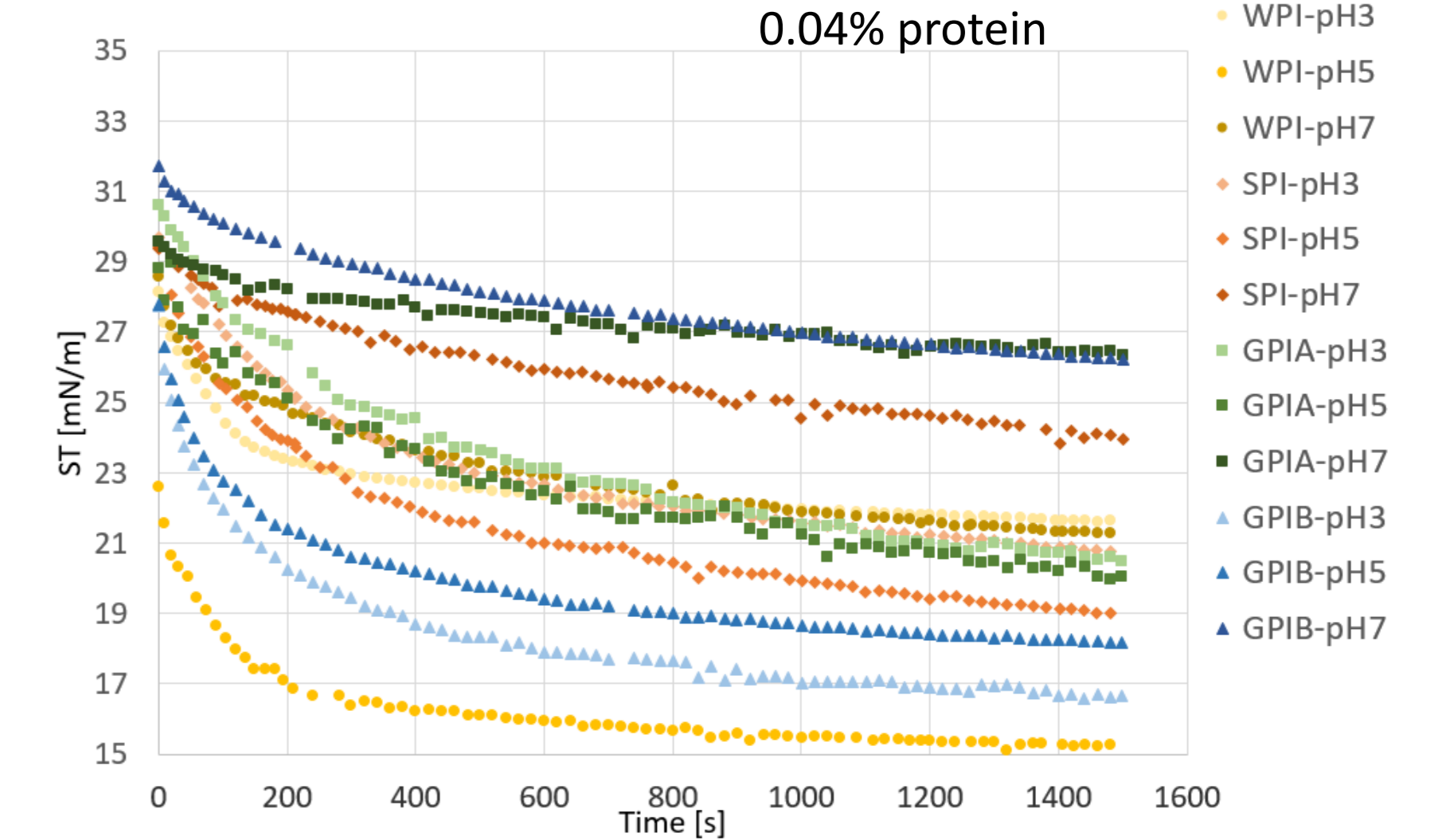
Solubility profile and ζ potential



SDS-Page



Interfacial tension O/W



Conclusion

- Heat treatment improved the removal of chlorophyll.
- Heat treatment had a negative effect on the protein extraction yield.
- The fractions obtained throughout the process in both methods had the main bands related with RuBisCO subunits, matching with commercial pure RuBisCO.
- Protein powder obtained by both methods had higher solubility than other plant proteins (e.g. soya).
- Grass protein isolate decreased the interfacial tension at pHs close to the isoelectric point.
- Grass protein obtained through Method B exhibited better interfacial properties than SPI at acidic pHs, and even better than WPI at pH 3.
- Optimal conditions must be chosen depending on the intended application of the final ingredient.

