**Tailoring quinoa leaves *(Chenopodium quinoa)* as a source of soluble proteins for food applications**

Sara Pérez-Vila1, 2,Francisca Acevedo3, 4, André Brodkorb1, Nathalia Baptista Dias4, Mark A. Fenelon1, 2, James A. O'Mahony2,Laura G. Gómez-Mascaraque1

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

*2School of Food and Nutritional Sciences, University College Cork, Cork, Ireland*

*3Department of Basic Sciences and Center of Excellence in Traslational Medicine (CEMT), Faculty of Medicine, Universidad de La Frontera, Casilla 54-D, Temuco, Chile*

*4Scientific and Technological Bioresource Nucleus, BIOREN, Universidad de La Frontera, Avenida Francisco Salazar 01145, Temuco, Chile.*

**Introduction:**The continued shift towards a more plant-based diet is driving the need for the development of new protein sources for a more sustainable healthy human diet [1]. In this context, plants are proposed as the preferred alternative source of proteins. Specifically, green leaves are proposed as a source of RuBisCO, which is an enzyme participating in the photosynthesis. It is considered the most abundant protein on Earth [2]. The aim of this work was assess quinoa leaves as a source of soluble proteins and compare four different species in their nutritional value and functional properties.

**Method:** Two species of quinoa were grown in Ireland and two in Chile. The leaves were harvested, dried and mill. For the protein extraction, the preserved quinoa leaves were suspended in water and centrifuge to remove insoluble cells and debries. The soluble fraction was purified by acid precipitation at pH 4, resuspended at pH 7 and freeze-dried to obtain a protein concentrate powder. The protein extracts obtained from the different quinoa leaves were characterized in terms of proximal analysis, detailed protein composition, nutritional value and functional properties.

**Results:** The proteomics characterization of the samples by Matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) confirmed the presence of RuBisCO as the most intense band displayed by electrophoresis (SDS-PAGE). The extract covered most of the essential amino acids as previously reported with other RuBisCO extracts [3]. The four extracts exhibited a protein content between 52.2 ± 0.34 and 63.3 ± 2.02 % with extraction yields between 0.95 ± 0.21 and 3.51 ± 0.56 % (g protein extract/ 100 g of dried quinoa leaf). The protein extracts showed a typical solubility profile with the lowest solubility close to the isolectric point of RuBisCO and over 50% (g soluble protein/ 100 g protein) for most of the pH range. However one of the extracts showed a higher solubility of more than 80% across the pH range.

**Conclusion:** The main differences between the four protein extracts were observed in the content of micronutrients and the extraction yield; which subsequently influenced the solubility profile and functional properties. Further research is needed to select the optimal conditions for growing and harvesting the raw material. Protein extracts from quinoa leaves are a potential source of proteins with functional properties into the food matrix.

*References:*

1. Di Stefano, E., et al., *Plant RuBisCo: An Underutilized Protein for Food Applications.* Journal of the American Oil Chemists' Society, 2018. **95**(8): p. 1063-1074.

2. Ellis, R.J., *The most abundant protein in the world.* Trends in Biochemical Sciences, 1979. **4**(11): p. 241-244.

3. Pérez-Vila, S., et al., *Extraction of plant protein from green leaves: Biomass composition and processing considerations.* Food Hydrocolloids, 2022: p. 107902.