Protein fingerprinting by capillary electrophoresis with ultraviolet absorption diode array detection for differentiation of quinoa varieties

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Quinoa (Chenopodium quinoa Willd.) is an andean grain with more than 3,000 ecotypes recognized for its exceptional nutritional properties. In western countries, where it is sold as a gluten-free protein-rich super food with a broad amino acid spectrum, quinoa trade and consumption is rapidly expanding. Quinoa is consumed as whole grain or after different processing methods (e.g. extrusion), but it is also milled to produce high-value flour, which is susceptible to adulteration. In consequence, there is a growing interest in developing novel analytical methods to expand the knowledge regarding quinoa composition. In this study, we developed a rapid and simple capillary electrophoresis-ultraviolet adsorption diode array detection (CE-UV-DAD) method to obtain characteristic multiwavelength electrophoretic profiles of protein extracts from different quinoa grain varieties (black, red, white from Peru and royal white from Bolivia). Then, advanced chemometric methods (i.e. multivariate curve resolution alternating least squares, MCR-ALS, followed by principal component analysis, PCA, and partial least squares discriminant analysis, PLS-DA) were applied to deconvolute the components present in the CE-UV-DAD electropherograms and classify the different quinoa varieties according to their differential protein composition.

Keywords
CE-UV-DAD; classification; multivariate curve resolution; partial least squares discriminant analysis; proteins; quinoa