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"Bridging the gap between increasing knowledge and decreasing resources"

Use of Lab-on-a-Chip Technology in Characterisation of Seed Storage Proteins and Protein Fractions in Inca Peanut (*Plukenetia volubilis*) Samples

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Abstract

Inca peanut (*Plukenetia volubilis* L.) is oil seed crop originated in Peruvian Amazon. The kernel possesses great nutritive composition beside high levels of essential fatty acids ($\omega 3$ and $\omega 6$) high level of storage proteins (~27 %). Protein spectra of single seed samples and bulked seed samples of *Plukenetia volubilis* were isolated from collected Inca peanut seeds in ten localities of Peru. There were characterised storage seed protein and three Osborne protein fractions - albumins+globulins, prolamins and glutelins. Protein bands were evaluated by the classical SDS-PAGE method. Protein bands of total seed protein were detected in the range of molecular weight 10-75 kDa. A large portion of Inca peanut protein formed albumins and globulins, abundant patterns were detected in position from 55-75 kDa and 15-35 kDa. *Plukenetia volubilis* samples were very low in prolamin fraction, on gel four subunits were found out with molecular weight from 20 to 25 kDa. In the obtained spectra were detected differences in intensity of protein bands, but the polymorphism in band position has generally been found low among for all tested samples. Visualized protein pattern were compared with obtained protein spectra by using the chip microfuidic electrophoresis. The recent lab-on-a-chip technology provided quick quantification of protein bands with computerized interpretation. The comprehensive protocol employing chip electrophoresis was established for purposes of description protein patterns of Inca peanut. Detailed pattern description of each group was provided here in the form of simplified patterns code for albumins+globulins and prolamins. Inca peanut seeds can be considered as a gluten-free due to low content of prolamin fraction.

Keywords: *Plukenetia volubilis*, proteins, SDS-PAGE, chip microfluidic electrophoresis

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