Biochemical aspects of food sustainability: molecular basis of bread improvement through enrichment with sprouted legumes flour

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S.M. Borgonovi[I], S. Iametti *[I], A. Marti[I], A. Sergiacomo[I], M. Di Nunzio *[I]

[I]DeFENS, University of Milan, Milano, Italy

Legumes offer balanced nutritional profile, but presence of anti-nutrients and digestibility issues hinder their staple food status. Biotechnological approaches, including germination, aim to modify the macromolecular composition of legumes, lowering the levels of anti-nutritional factors and modifying relevant macromolecular traits. After 72-hour, germinated bean flour showed a marked decrease in anti-nutritional factors (phytates and protease inhibitors) and an increased protein hydrolysis. The flour from germinated cowpea was used to prepare bread up to a 25 % addition to wheat flour, with non-sprouted bean flour as a control. In addition to protein profiling and quantitative analysis of anti-nutritional factors, bread samples underwent in vitro static digestion following the INFOGEST protocol, with protein hydrolysis monitored at the end of the gastric phase, as well as at the middle and final steps of the intestinal phase. Protein profiling suggests the absence of interactions between wheat proteins and cowpea proteins regardless of the germination step. Also, cowpea proteins appeared to be thoroughly degraded to small-sized peptides – after duodenal digestion - in both bread types. Peptide profiling is currently under way, in order to pinpoint the possible formation of bioactive species. Finally, from a nutritional standpoint, bread containing sprouted bean flour had slightly higher levels of resistant starch than both the non-enriched bread and the bread enriched with non-sprouted cowpea flour.

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* The authors marked with an asterisk equally contributed to the work.