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Amaranth Protein Isolates at the Air-Water Interface

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Amaranth is a grain mostly harvested in subtropical and some tropical regions of Asia Africa and America where it constituted traditional meals. The renewal of interest for its crop lies in its nutritional value: the seed contains a higher protein value than other cereals and its essential amino acid composition is close to the optimum required in the human diet. Its high nutritional value, coupled with interesting functional properties, led us to ask whether these proteins could be used as dispersing agents in food products to get a better balance in essential amino acid.

Amaranthus hypochondriacus isolate proteins were extracted from defatted seed flours. The surface activity of their soluble extracts was studied at pH 2 and 8 at the air-water interface. The soluble extract at pH 2 exhibits a better surface activity and a significantly higher viscous modulus than the soluble extract at pH 8. The spectra obtained by Infrared Reflection Absorption Spectroscopy (IRRAS) revealed that the film thickness increases more weakly at pH 2 than at pH 8 during the compression of the film. The simulation of spectra obtained by angular variation indicates that the proteins re-organise more significantly at the interface at pH 2 than at pH 8. At pH 2, amaranth proteins suffer a significant denaturation and dissociation, whereas at pH 8 the native structure is preserved. This structural difference explains the different behaviors at the interface.

These results orient the single use of amaranth protein isolates to acidic pH while mixed films with other proteins must be considered at higher pH.