Process and mixture variables impact the textural acceptability of vegan mayonnaises more than the plant-based protein ingredient used.

The acceptability of matrices has been determined by a physico-chemical characterization dataset clustering. Each ingredient selected allowed production of at least one acceptable experimental matrix, independently from process and mixture variables.

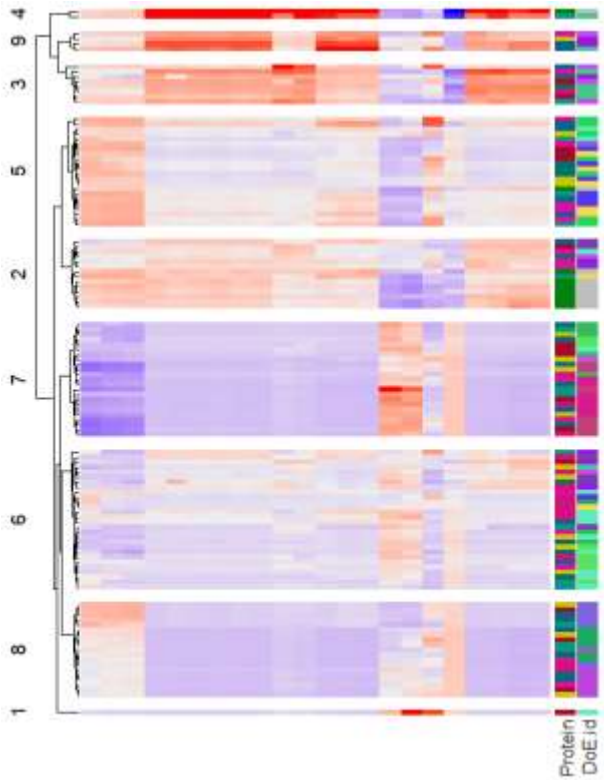
Food emulsions are ubiquitous in the food sector

Their appearance, texture and mouthfeel are crucial aspects of the consumer appetite and critical for acceptability. In recent years, food manufacturers have reacted to growing flexitarian and vegetarian trends. Until now, a systematic approach to achieve desired textural effects in emulsion is missing and development step is still an empirical approach. The PLAN P project aims to accelerate the design of new products by diversifying the nature of the proteins, with the support of spectral analysis coupled with artificial intelligence algorithms to predict variables related to the texture of products.

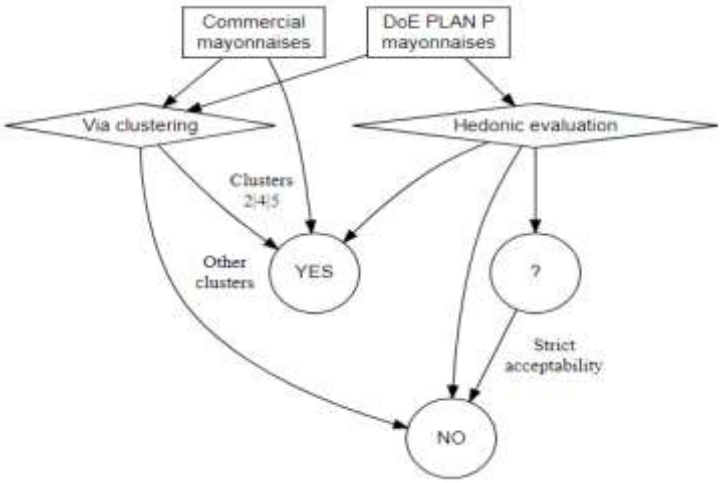
Plant-based protein ingredients (i.e. varying from flour to protein hydrolysate), from different plant sources currently on the market were characterized in terms of techno-functionality. A partitional clustering of the techno-functional characterization dataset was performed. Protein content, emulsifying capacity and emulsion stability were used to perform a clustering of the dataset. One ingredient was selected per cluster to produce thick emulsions with low energy emulsification (i.e. mayonnaise).

A fractional factorial plan with mixing constraints was used to produce matrices with different microstructures. Each matrix was elaborated and characterized by physico-chemical techniques and spectroscopic analyses. In parallel, commercial products have been analyzed to build a reference dataset for the thick emulsion with low energy emulsification.

To determine the acceptability of experimental mayonnaises, a partitional clustering of the physico-chemical characterization dataset was performed. The experimental matrices which were in the same cluster as a commercial mayonnaise were classified as acceptable. Each ingredient selected has produced at least one acceptable experimental matrix, independently from process and mixture variables. Thus, process and mixture variables impact the textural acceptability of vegan mayonnaises more than the techno-functional properties of the plant-based protein ingredient used.



To validate this approach, a comparison was made between the acceptability determined via the physico-chemical characterization clustering and the strict acceptability resulting from the hedonic textural evaluation of the experimental mayonnaises (accuracy: 80%).



Based on the communication with the data producing work packages, the IT infrastructure to facilitate data submission and analysis in the context of the project was designed. The architectural specification produced has allowed the download of the different tabular databases developed, as well as their subsequent transformation and integration. This will ensure that the dataset is ready to go through the Artificial Intelligence pipeline to be adopted to activate the PLAN P predictive models. A set of basic implementations of generic algorithms was used for initial testing on the available data.

Author(s) info

Jonathan Thévenot, ADRIA, jonathan.thevenot@adria.tm.fr and Camille Renaud, ADRIA, camille.renaud@adria.fr (www.adria.tm.fr)