Adding value to legumes through a gastronomic approach: the proof of concept of food models

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Scenarios to face climate change always involve legumes, showing that higher human consumption of local legumes would reduce greenhouse gas emissions. However, human consumption remains lower than recommended, and local production is little valued. The approach of the AGAPE project is to bring added value to both the consumer and the producer through the gastronomic valorisation of pulses.
Two innovative gastronomic recipes developed by chefs were simplified into food models mimicking shortcrust pastry and purees. Each food model was characterized by quality criteria (functionality and sensory) and used to identify the characteristics of seeds and flours correlated to culinarity.
Five species (white and red beans, chickpea, green lentil, and lupin) locally produced in western France were used as seeds or as flour. Grains were characterized by size, weight and hydration capacity; flours by proximate composition, particle size distribution, color, and functional characteristics such as density, and water/oil absorption capacity. For the shortcrust pastry, bake yield, color measurement, textural and sensory analyses were performed and for purees, cooking time, mixing time and texture.
Large variations among the species were noticed in color parameters, bake yield and water absorption capacities. The significant differences observed on the flours (proximate composition, water/oil absorption capacity, particle sizes, and color) could partly explain the variation of the shortcrust characteristics between species. Shortcrust pastries made with lupin highlighted extreme characteristics compared with others legumes, in fibre, protein and lipids. Moreover, fibre contents were positively associated both with water absorption capacity and dough hardness resulting in crumbly pastries. Starch contents were positively correlated with dough springiness, adhesiveness, cohesiveness, and extensibility.
Purees showed large differences in viscosity and compression force depending on the pulses, the beans purees with the highest compression force and the red bean puree the highest viscosity.
The use of food models to predict food quality based on legume seed characteristics seems to be a good way to explore the culinary potential of these species, and to explore new functionalities. This approach is a proof of concept which is further explored in the JACK research project.