BIOQUALIM

From cultivated biodiversity to human health prevention: a cross-disciplinary research-action project

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CONTEXT

Food consumption, especially meat consumption, stands a critical nexus between human health and environmental sustainability. The increase in meat production has serious consequences on the environment, such as deforestation and greenhouse gases (GHG) emissions. Moreover, intensive breeding practices have a deep influence on the quality of food, thereby directly impacting human health. Addressing one of Earth's primary nutritional challenges, especially in industrialized countries, involves reducing animal proteins while increasing plant proteins in daily diets (Rubio et al., 2020). In addition, adopting a plant protein-enriched diet could prevent the dysbiosis of intestinal and oral microbiota, hence prevent non-communicable diseases (NCDs) such as periodontal diseases and cancers (Martinon et al., 2021). However, the alarming decline in cultivated biodiversity, with a 75% loss in the last century, severely limits the variety of available plant protein sources (mainly composed of cereals and pulses) required to cover recommended daily amino acid intake (FAO report, 2010). The BIOQUALIM project will contribute both to increase cereal biodiversity in Lyon region and to the prevention of NCDs, more particularly to cancer prevention, with two complementary primary and tertiary prevention approaches, organized around four Work Packages, as presented below.

WP1 : nutritional analyzes of local cereals

OBJECTIVES: to compare the contents in some nutrients, proteins and anti-cancer bioactive molecules, in ancient wheat species (einkorn, emmer, spelt) and common wheat (soft wheat).

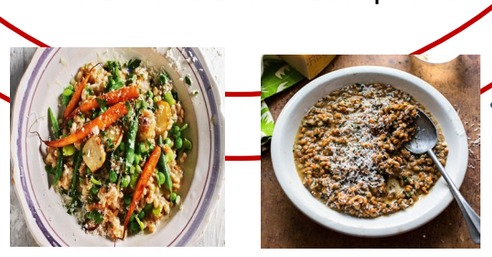
METHODOLOGY: the samples are: 7 varieties of einkorn, 8 varieties of emmer, 8 varieties of spelt and 8 varieties of soft wheat, grown organically at the CRBA (Charly, 69). The analyses will be carried out by ICP-MS, GC-MS/MS, and with physico-chemical characterization of plant proteins.

Cereals such as ancient wheat species:
- einkorn = "petit épeautre"
- emmer = "moyen épeautre"
- spelt = "grand épeautre"

have several agronomical advantages (Moudry et al., 2011) and higher nutritional quality compared to soft wheat "blé tendre" (Dinu et al., 2018).

Organic local cereals (farmer partners and "Centre de Ressources de Botanique Appliquée" partner, PhD of Sofia Correa, 2023)

Culinary preparations from the different ancient wheat species



WP2 : Populational-based behavioral study regarding plant-based food consumption

OBJECTIVES: To investigate the perceived behavior captured in a general population sample, regarding plant-based food consumption.

METHODOLOGY: 3 cohorts (the farmers' customers, and HCL professionals and patients).
- -Survey online (35 items)
- -Semi-structured interviews

WP3 : Clinical study investigating the influence of plant protein-enriched diet on oral microbiota

OBJECTIVES: To evaluate the impact of plant protein-enriched diet on i) oral microbiota dysbiosis, a risk factor of NCDs such as cancer, and on ii) quality of life, in a general population.

METHODOLOGY: General population:
consumption -meat +einkorn cereal, during three months, with monitoring of:
- -Interdental microbiota => qPCR
- -Oral and general health
- -Quality of Life

WP4 : Supportive Care in oncology : peer support and culinary workshops

OBJECTIVES: to evaluate the impact of peer-support culinary workshops (animation by a former patient) teaching plant protein-enriched diet, on the intention to change culinary behavior and the dietary quality of life of post-therapy cancer patients.

METHODOLOGY: Patients
- -post-therapeutic cancer
- -Semi-structured interviews

Rubio et al., *Nat Commun.*, 11, 6276 (2020).
Martinon et al, *J Clin Med.*, 10, 197 (2021).
Moudry et al, *Scientific Res. Essays*, 6, 4273 (2011).
Dinu et al, *J. Nutritional Biochem.*, 52, 1 (2018).