RÉPUBLIQUE FRANÇAISE
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INRAE

Consortium
2021-2023

HOLOGRAIN

How successions of microbial communities in the cereal food production chain determine final product quality

The HoloGrain consortium mobilises different INRAE teams whose work targets a particular stage of the production chain (pre- or post-harvest) or a specific question. This network will make it possible to integrate the different stages and to follow a wheat grain holobiont throughout the agri-food chain.

The "cereal" sector is a particularly relevant example of a food production chain made up of successive stages characterised by particular/different microbiota that can influence the development of the quality (sanitary, organoleptic, nutritional and technological) of the final food. The challenges are as follows:

- To be able to follow a grain holobiont throughout its 'life' with shared tools and methodologies, and to characterise the determinants of its evolution leading to the preservation or development of food qualities.
- To know the microbial flows or successions linked to breaks in conditions in order to identify the origins of inocula and to evaluate the importance of priority effects in the assembly of these communities. All of these data will make it possible to define favourable evolution markers and integrated action levers throughout the agri-food chain.
- To study the possibility of setting up strategies for building the quality of cereal products based on the management of microbial communities at the various links in the production chain.

Objectives

The HoloGrain consortium will enable the various teams to work together and share data and knowledge in order to highlight the importance of microbial flows or successions, from the seed to the products consumed, in the development of the quality of cereal-based foodstuffs (wheat and barley), and to propose levers for achieving the desired quality criteria. Its ambition is to:

Coordinators

Jean-Michel SAVOIE (MYCSA)
jean-michel.savoie@inrae.fr
Florence FORGET (MYCSA)
florence.forget@inrae.fr

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Food chain, grain, cereals, microbial flux, microbiota, holobiont

INRAE unit
MYCSA
IRHS
IGEPP
BFP
SPO
LUBEM
IATE
AGIR
UREP

Partners
UMR QualiSud (Univ. Montpel-lier)

Arvalis, IFBM, ITAB...
(Instituts techniques)

- Bring together, in a shared reflection, actors involved in research on cereals who are interested in microbial communities and their evolution, from the seed to the food consumed.
- Exchange know-how, techniques and materials in order to define a methodological base that can be used throughout the food chain.
- Enable research actions already underway to progress more rapidly and facilitate their integration.
- Validate the concept of the influence of priority effects in the holobiont on the construction of product qualities, and produce a multidisciplinary synthesis of knowledge validating this concept and highlighting the remaining gaps.
- Build the basis for a research project on 'grain holobionts' from seed to consumed product, in order to propose it to national and European partners and anticipate responses to calls for projects.

Partners

INRAE division	INRAE unit	Expertise
SPE Plant Health and Environment	MYCSA	Mycology and microbiology, grain storage stage. Biochemistry, Metabolomics, Sanitary quality (mycotoxins).
	IRHS	Seed microbiota
	IGEPP	Microbiota of the rhizosphere
	BFP	Virome - phytovirus - mycovirus
MICA Microbiology and the Food Chain	SPO	Microbial ecology, fermentation stage and transformation into bread. Bioinformatics
	LUBEM	Microbial ecology - soil - mycotoxins - phytopathology
TRANSFORM Science for Food, Bioproducts and Waste Engineering	IATE	Biochemistry - Cereal processing
AGROECOSYSTEMS Agronomy and Environmental Sciences for Agroecosystems	AGIR	Agronomy - Conservation Agriculture - Soil & Crop Health
BAP Plant Biology and Breeding	UREP	Plant holobiont & cereal breeding

Partners	Expertise
UMR QualiSud Univ. Montpellier	Microbial ecology, mycotoxins and fermentation of cereals
Arvalis, IFBM, ITAB, ... Instituts techniques	Cereal sectors

Contact
holoflux@inrae.fr