Microbiome in the context of Food2030 strategy

European Research and Innovation perspective

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A "Perfect Storm"

- 9 billion to feed by 2050
- 60% more food demand by 2050

- 2 billion overweight & obese
- 795 million underweight
- Yet 33% food wasted

- Uses 70% H2O
- Uses 30% Energy
- Delivers 25% GHG

2030 GOALS

- Zero Hunger (SDG)
- Food waste by 50% (SDG)
- CO₂ by 1.5-2°C (COP21)
Political Opportunity

Juncker Priorities

2. A connected digital single market.
3. A resilient Energy Union with a forward-looking climate change policy.
4. A deeper and fairer internal market with a strengthened industrial base.
5. A deeper and fairer Economic and Monetary Union (EMU).
6. A reasonable and balanced free trade agreement with the United States.
7. An area of justice and fundamental rights based on mutual trust.
8. Towards a new policy on migration.
9. Europe as a stronger global actor.
10. A Union of democratic change.

Sustainable Development Goals

COP21+

IPCC

The IPCC’s priorities for the next six years: 1.5°C, oceans, cities and food security
The Food System

Good soil, water, land & biodiversity

Connecting land & sea

Food & Feed: trade, relations, culture, jobs, etc

Future-proofing

By 2030

Sustainable

Resilient

Responsible

Competitive

Inclusive
When it comes to Microbiome

MICROBIOME
Definition Microbiome

*Microbiome refers collectively to communities of microorganisms and their genome in a defined environment*. 

*Marchesi and Ravel Microbiome (2015)3:31*
Xylella strongly perturbs the microbiome.

In all but one sample (Kal_89), Fungi dominate the microbiome with 70-87% abundances of the total metagenome and Bacteria represent the remaining 13-30% (Fig. 1 and 2). Archaea and Viruses are present with negligible abundances. This Fungi/Bacteria ratio is inverted in sample Kal_89 in which total Bacteria and Xylella fastidiosa represent respectively the 61% and the 15% of the total microbiome, whereas Fungi occupy the remaining 24% (Fig. 2).

**Fig. 2.** Krona (Ondov et al., 2011) pie charts of the metagenomes of a healthy (Kal_53) and infected (Kal_89) cv Kalamata olives. Note the inverted Fungi/Bacteria ratio.

Xylella microbiome perturbation in Kal_89 is also demonstrated by a strong decrease of intra-sample ecological diversity. a-diversity calculated with two ecological indexes clearly shows that, when Xylella reaches a high population size in tissues of the susceptible cv Kalamata, the microbiome richness shifts downward (Table 1).
Why Microbiome?

- *Technological breakthroughs*
- *International momentum (USA, CN, CA, NZ, AU)*
- *Information hidden within microbiomes*
Exploiting the huge potential to benefit Europeans citizens

Microbiome - the genomes of a community of microorganisms (e.g., bacteria, fungi, viruses) that inhabit a particular environment:

- in or on certain parts of the body
- in a sample of soil
- on the leaf of a plant

FOOD SYSTEM MICROBIOMES

- Improving our knowledge of microbiomes and their interactions
- Can boost food and nutrition security

FOOD PRODUCTS
GUT
ANIMALS
PLANTS
SOIL
WATER
...but there is a gap in our knowledge which needs to be addressed in order to achieve more resilient and efficient food systems

To this end...

The EU will invest

+ €100 million

To address Microbiome Research and Innovation (R&I) aiming at:

- Coordinating cross-cutting research efforts on the Food System Microbiome (FSM)
- Better alignment and coherence of microbiomes research at EU and global level towards a unified microbiome initiative
- Promoting a multi-actor, multi-sectorial and multi-disciplinary approach.
Promoting a multi-actor, multi-sectorial and multi-disciplinary approach.

The investment substantially adds to EU countries R&I efforts, and other EU initiatives.

**EU R&I investment** will target areas such as...

**FOOD PRODUCTION**

**PLANTS**
Reduce pesticides use and improve the quality of food products and the amount produced

**AQUATIC**
Reduce water pollution and improve food products

**SOIL**
Improve fertility and reduce mineral fertiliser use

**PACKAGING**

**ANIMALS**
Improve animal health, welfare and food products.

**WASTE STREAMS**

**HEALTHY PEOPLE**

**DISTRIBUTION**

**LOGISTICS**
The untapped potential

Only 1% of all microbiomes are currently providing applications in health, food systems, and ecosystem resources.

The remaining potential is enormous.
European Commission Role

- Facilitate multi-actor engagement
- Align
- Structure
- Boost
How to provide a more coherent approach to Microbiome R&I activities?

1. Propose an umbrella mechanism to frame and convey Microbiome projects with relevance to FOOD 2030 and Food Systems

2. Incorporate the selected projects within the complete EU Microbiome portfolio (contribution to IBF)
Thank You


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