Microbiomes delivering healthy and sustainable food systems

Microbiomes are present in every step of the food system production chain and are important to ensure sustainable future food production systems.

Microbiomes play a key role for environmental, plant, animal and human health and may have positive or sometimes undesirable effects on health, food security and food safety objectives, climate change mitigation and sustainable bioeconomy.

To be able to benefit from microbiomes, there is a pressing need to harmonize strategic research and innovation (R&I) agendas for future microbiome-food systems activities, to connect R&I priorities with European regulations, learn how to manage risks associated with the potential harm some of them can cause and prepare for acceptance on economic markets and within society.

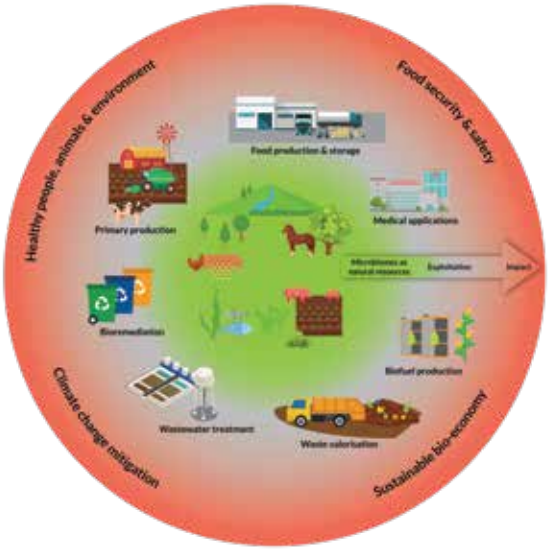

Figure 1. Microbiomes have key roles in the growth, preparation, conservation and valorisation of foods at each part of the food system. They impact directly and indirectly on certain UN Sustainable Development Goals, as well as European policies such as the Green Deal and Climate Pact, and policy initiatives such as FOOD2030.

Key policy priorities

1. Appropriate regulatory frameworks[1] :

An appropriate policy vision to provide guiding principles for EU-wide safety and registration rules such as a 'One Microbiome Concept' comparable to the One Health approach. Concise safety standards and evaluation requirements concerning different microbes used in food, feed, biocontrol and bio-preservation are a prerequisite for the safe production, application and consumption of microbiome-based products, developed together with expert guidance on different aspects of relevant regulations.

2. More, and more coherent, research funding[2] :

Microbiome research needs aligned funding programmes in the fields of food, agriculture and the environment to avoid costly duplication within and between relevant programmes. These programmes should allow a systems and transdisciplinary approach and should consider large infrastructures such as biobanks and open science platforms.

3. Support the development of future microbiome applications to[3 4] :

- Increase microbiome diversity in agri-food systems
- Implement microbiomes to boost sustainable primary food and feed production
- Acknowledge microbiome contribution to quality & safety of food products
- Grow and prepare healthier food for healthier humans
- Expanding the potential of food systems microbiomes for a healthy planet
- Implement microbiomes in a One Health approach reducing the risks of pandemics and the emergence of antimicrobial resistance

4. Societal awareness of microbiome R&I, for instance, through education, at all levels to[5] :

- Increase microbiome literacy and increase awareness on the importance as well as potential risks of microbiomes
- Ensure acceptance of future microbiome products and processes, once applications arrive on the market through social science
- Prepare the market with relevant skills to use microbiome applications

[1]*MicrobiomeSupport Consortium (2019) Call for action to foster microbiome research: a driver for future-proof food systems & circular economy innovations. Available on www.microbiomesupport.eu.* [2]*Meisner et al. (2021) Calling for a systems approach in microbiome research and innovation. DOI: 10.1016/j.copbio.2021.08.003.* [3]*Maguin et al. (2022). Unpublished.* [4]*D'Hondt et al. (2021) Microbiome innovations for a sustainable future. DOI: 10.1038/s41564-020-00857-w.* [5]*MicrobiomeSupport Deliverable (2022) "Report on educational needs".*