

## Press Release

Vienna, 28 January 2021

# THE POTENTIAL OF MICROBIOMES - HELPERS FOR THE ENVIRONMENT AND HEALTH

Recommendation published to use microbiomes more effectively

**AIT experts Angela Sessitsch and Tanja Kostic (Center for Health & Bioresources), together with eight international partners, publish a recommendation on how to harness the potential of microbiomes on the path to a sustainable future. It highlights the importance of international collaboration, knowledge exchange and the appropriate framework.**

Billions of microorganisms live all around us, significantly influencing our lives every day. Most of the time we do not notice it, yet they are of great importance for our health and play an essential role in the environment and food production. The community of all microorganisms (viruses, bacteria, archaea, unicellular eukaryotes, fungi) in a given habitat is called the "microbiome". These play a critical role in sustaining life on Earth. For example, marine microbiomes produce much of the oxygen we breathe and play an indispensable role in carbon storage and nutrient cycling. Soil microbiomes fix nitrogen and methane, enabling fertilization and avoiding greenhouse gas emissions. The human gut microbiome has clear links to human health, and the microbiome of plants and animals also plays an important role in their health.

*"Our growing understanding of the interconnectedness of microbiomes in environmental and food systems suggests that microbiome innovations have the potential to improve the sustainable production of food, feed and biofuels while supporting the principles of the circular economy,"* explains Angela Sessitsch, a researcher at the Center for Health and Bioresources at AIT Austrian Institute of Technology. Sessitsch heads the Competence Unit Bioresources of the Center for Health & Bioresources and is one of the world's most cited researchers in this field.

### **Microbiomes significantly influence the world around us**

For example, targeted modifications of plant microbiomes can increase crop yields and improve the salt and drought tolerance of crops. Soil microbiomes can be used as biofertilizers and to reduce nitrogen leaching. The use of environmental microbiomes can accelerate the degradation of pollutants. Furthermore, it is possible to use microorganisms to recycle organic waste materials from the food and fibre industries, thereby replacing fossil fuels. And knowledge of food microbiomes is also crucial in the production and preservation of fermented foods, such as bread, chocolate, beer, or yogurt. Microbiomes therefore play an important role in building a sustainable bioeconomy in which fossil raw materials and energy sources are replaced by renewable resources.

To advance research and innovation in this field, several powerful international consortia have been established in recent years, including the EU project "MicrobiomeSupport" led by Angela

Sessitsch and the International Bioeconomy Forum (IBF), in which the EU, Canada, the USA, Argentina, South Africa, India, Australia, New Zealand or China, among others, are represented. Ten experts from these consortia, together with the EU Commission, have now compiled the potential of microbiome innovations and the prerequisites for their implementation in a joint recommendation published in the renowned journal Nature Microbiology.

"In our role as an international consortium of microbiome scientists and policy makers, we argue that microbiome applications could support solutions to address global challenges such as food security, food safety, health and well-being, waste management, and climate change mitigation," Sessitsch said. Thus, microbiome innovations can directly contribute to the UN Sustainable Development Goals and the EU Green Deal.

### **The untapped potential of microorganisms**

In order to realize this potential, however, some preliminary work still needs to be done. That is because, as AIT researcher Tanja Kostic, one of the study's two lead authors, explains, research in some areas is still at an early stage. In the eyes of the study authors, the most important requirements to enable microbiome innovation are:

- more research to fully understand microbiome function and biochemical processes
- interdisciplinary research: better collaboration between scientists from different disciplines, strengthening of the cooperation between academia and industry as well as intensifying data sharing
- greater international collaboration, alignment of global research agendas and funding to enable fair and equal global partnerships and knowledge sharing
- new infrastructures ("microbiome centres"), especially for microbiome preservation and data storage and sharing
- long-term investments to ensure that innovations are translated into real-world applications
- public trust in and acceptance of new technologies: intensive communication between research, politics, authorities, industry, users (e.g. farmers) and the general public is considered necessary
- clear legal regulations at both national and international level: this includes ethical guidelines for integrating innovations into production systems in a responsible manner

Progress has already been made in some of these areas: for example, the "MicrobiomeSupport" project is working with a wide range of global stakeholders to develop a shared strategic research and innovation agenda for microbiomes in food systems.

*"Microbiomes can provide an abundance of bioactive compounds and enable activities that benefit agriculture, the environment as well as animal and human health. Harnessing these opportunities of microbiome innovation through investment, collaboration, regulatory change, and outreach will greatly increase the likelihood of achieving the Sustainable Development Goals,"* the study authors summarize.

Study: Kathleen D'Hondt, Tanja Kostic et al: Microbiome innovations for a sustainable future.  
Nature Microbiology

Links: [www.microbiomesupport.eu](http://www.microbiomesupport.eu) / [www.bioeconomy-forum.org](http://www.bioeconomy-forum.org) /  
<https://www.nature.com/articles/s41564-020-00857-w>

More information about the Center:

<https://www.ait.ac.at/ueber-das-ait/center/center-for-health-bioresources>

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