



Plant and Soil Microbiomes for Sustainable Agriculture

A Workshop by CIRCLES

Workshop Report



Document Identification

<i>Project acronym</i>	<i>CIRCLES</i>
<i>Project title</i>	<i>Controlling mIcRobiomes CircuLations for bEtter food Systems</i>
<i>Grant agreement number</i>	<i>818290</i>
<i>Starting date</i>	<i>1 November 2018</i>
<i>Duration</i>	<i>6 years</i>
<i>H2020 Call ID and topic</i>	<i>LC-SFS-03-2018</i>
<i>Name of document</i>	<i>Plant and Soil Microbiomes for Sustainable Agriculture Workshop Report</i>
<i>Date</i>	<i>7 April 2021</i>
<i>Version</i>	<i>01</i>
<i>Status</i>	<i>Final</i>
<i>Dissemination level</i>	<i>Public</i>

The following document reflects only the author's view. The Agency is not responsible for any use that may be made of the information it contains.





Introduction

On 29 March 2021, Controlling mIcRobiomes CircuLations for bEtter food Systems (CIRCLES), a Horizon 2020 funded project (Grant Agreement N° 818290), organised the workshop “Plant and Soil Microbiomes for Sustainable Agriculture”. The event gathered policymakers, industry representatives and scientific experts who had the opportunity to discuss the role of the microbiome for climate-neutral and competitive agriculture in Europe.

After the introductory speech of Dr. Marco Candela (University of Bologna), Dr. Davide Bulgarelli (University of Dundee) briefly introduced CIRCLES and the advances the project has made over the past 2 years. CIRCLES has collected valuable data and knowledge on microbiomes which opens up new horizons for the food systems of the future.

The workshop consisted of three presentations:

- 1. The role of plant and soil microbiomes: zooming in on tomatoes and spinach food systems.**
- 2. Towards agricultural applications: plant biostimulants in EU legislation.**
- 3. U.S. perspective: microbiome analysis and support to crop cultivators.**

1. The role of plant and soil microbiomes: zooming in on tomatoes and spinach food systems – Dr. Davide Bulgarelli, University of Dundee.

Dr. Bulgarelli started off by explaining the important role of microbiomes in soil. The microbiome includes not only the community of microorganisms, but also their ‘theatre of activity’ and the whole spectrum of molecules produced by the microorganisms in the different locations: in bulk soil, in the rhizosphere and in the root itself. CIRCLES aims to understand the relationship and functional interactions between microorganisms and plants. If we understand the dynamics between them, we could develop the right tools to support the productivity of a crop. Microorganisms can be used as biostimulants (stimulating natural processes in the plant) as they enhance nutrient uptake and use



efficiency, tolerance to abiotic stress and protect them against pathogens. However, when certain microorganisms are present in a sufficient amount within microbiomes, the interaction between plants and microbes can also harm the plant. For this reason, continued microbiome research is crucial to fully understand their dynamics.

Microorganisms in soil can enhance plant nutrition and protection, decompose xenobiotics, minimise organic waste, prevent soil degradation and erosion, reduce greenhouse gas emission and increase carbon sequestration. In summer 2019, CIRCLES established two labs on spinach and tomato farms. Researchers analysed the samples and identified microorganisms that are characteristic to specific crops. Although research is still ongoing, and many questions still need to be addressed by scientists, researchers are increasingly revealing the potential of microbiomes.

2. Towards agricultural applications: plant biostimulants in EU legislation – Dr. Theodora Nikolakopoulou, European Commission DG GROW

Dr. Theodora Nikolakopoulou presented how plant biostimulants are currently regulated at European level. In June 2019, the European Commission adopted the Fertilising Products Regulation (FPR) (EU) 2019/1009. All the provisions of this regulation will be applicable as of 16 July 2022. The European Commission foresees the adoption of a new regulation, which will provide harmonised, but not mandatory, rules for placing fertilising products on the European market. Manufacturers can then choose whether they want to follow the European harmonised rules or national regulations. It is important to highlight, that the regulation does not regulate the use of products or mode of application but only the placing of products on the market.

Ms. Nikolakopoulou also presented the definition of plant biostimulants in the FPR:

“A plant biostimulants shall be an EU fertilising product the function of which is to stimulate plant nutrition processes independently of the product’s nutrient content with the sole aim of improving one or more of the following characteristics of the plant or the plant rhizosphere:

- *Nutrient use efficiency*
- *Tolerance to abiotic stress*
- *Quality traits, or*
- *Availability of confined nutrients in the soil or rhizosphere.* “





The FPR defines different safety requirements and authorised component material for plant biostimulants. However, a uniform procedure ensuring that all rules are followed and all product requirements are met is missing. In order to upgrade the harmonised standards, the Commission mandated the European Committee for Standardisation (CEN) to develop technical specifications for plant biostimulants.

3. U.S. perspective: microbiome analysis and support to crop cultivators – Dr. Alberto Acedo, Biome Makers

Dr. Alberto Acedo presented the company Biome Makers and his work in the workshop. Biome Makers is a global agritech company that focuses on the modeling of soil functionality to enhance the productivity of arable soils and to recover soil health. For the past 6 years, Biome Makers conducts research on soil microbiomes, how microorganisms and plants interact with each other in different circumstances and environments and how to prevent soil diseases.

Dr. Acedo described the importance of soil health and defined it by the soil's capacity to function as a vital living ecosystem that sustains life. Studying the abundance and diversity of soil microbiomes is key, as they represent an important marker of soil health and functionality.

The data Biome Makers has gained over the years is a unique insight into soil biology. It provides crop-specific information, in particular on how different crops interact with different microbiomes in different locations. This kind of research and data is crucial for improving not only the fertility and productivity of soil but also to prevent diseases and recover degraded soil.



Discussion with participants

The workshop was concluded with a round of discussions with the audience. During the exchanges, Dr. Nikolakopoulou explained that the FPR does not apply to plant protection products covered by the scope of the Plant Protection Products Regulation (Regulation 1107/2009). Most of the substances may enter into the formulation of fertiliser products after their successful registration in a database. But for microorganisms there are no such systems or frameworks which assess their functionality and safety. The Commission is working on this issue, but they are still looking for the best possible way to assess microorganisms. Lastly, Dr. Acedo and Dr. Bulgarelli answered questions from the audience related to their current research projects.

