



Embracing Complexity: Phytobiomes and a New Vision for Agriculture

14 July 2022

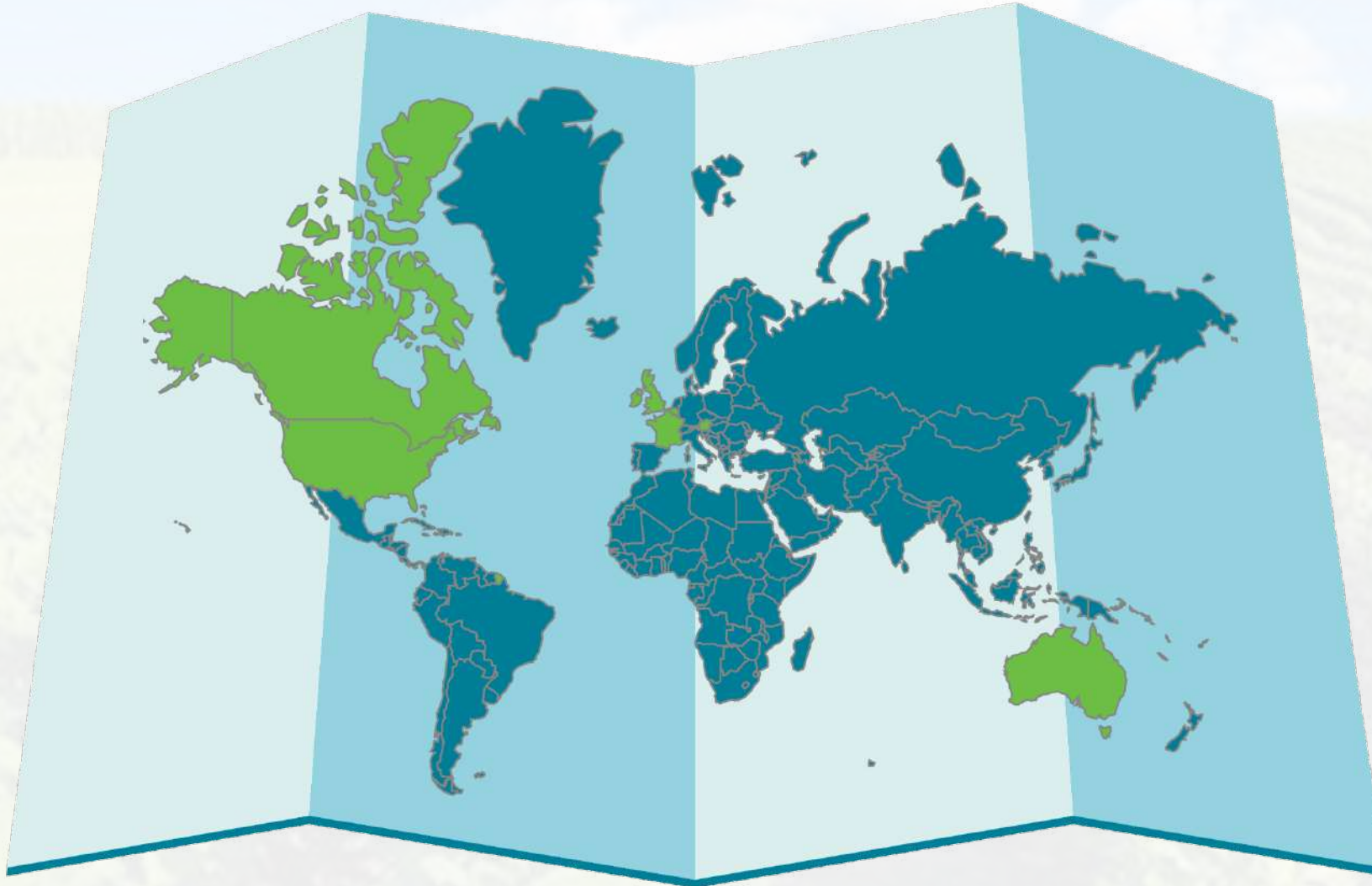
Kellye Eversole
Executive Director



Phytobiomes Alliance Sponsors



International Alliance for Phytobiomes Research



- Nonprofit, precompetitive research consortium
- Industry, Academia, and Government
- 8 countries
- Coordinating a paradigm shift in agricultural research and production

Moving From Simple to Complex

Traditional Science Approach



- Linear
- Reductionist
- Can be understood by focusing on individual components
(Soils, Plant genetics, Microbiomes, or Weather)

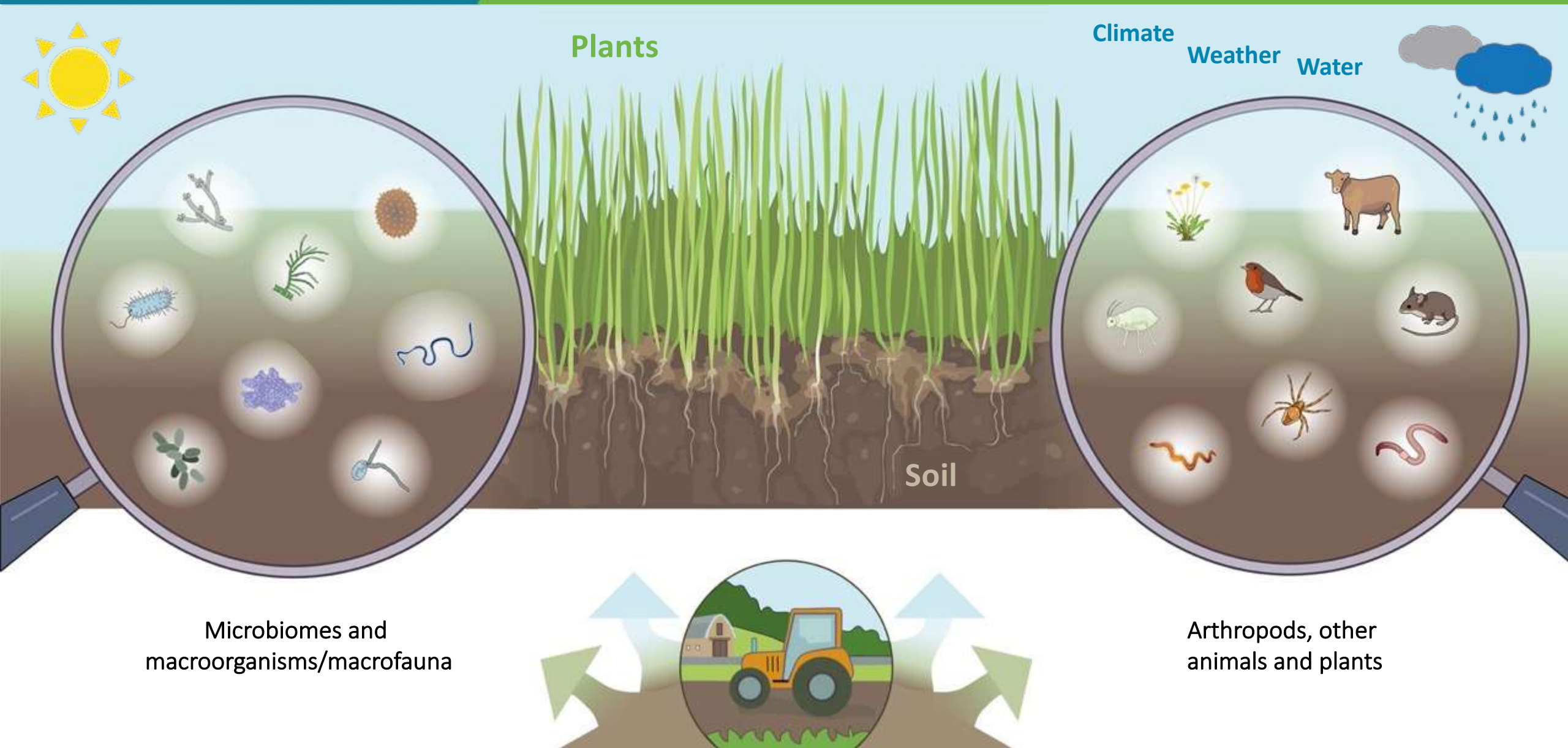
Agriculture is a Complex System



- Non-linear
- Multiple interactions and variables
- Adapts via learning or evolution
- Can be influenced

Paradigm shift to a complex systems approach

Phytophosphorus: Complex Systems of Plant-based Agriculture



All influenced by management practices

Examples of Phytobiomes

Crop Field



Pasture



Vegetable Garden



Forest



Grassland



Controlled Environment Phytobiomes

Greenhouse Farming



Vertical Farming



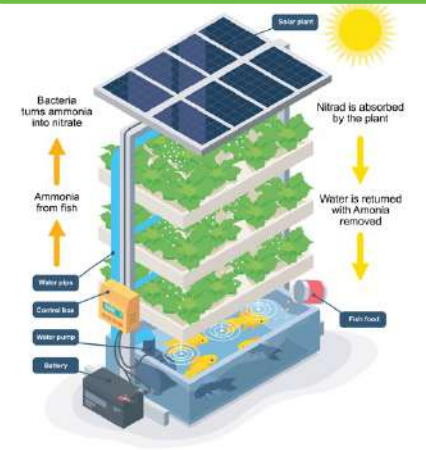
Hydroponic



Container Farming



Aquaponic



Phytobiomes Alliance Vision

By 2050, all farmers have the ability to use predictive and prescriptive analytics based on geophysical and biological conditions for determining the best combination of crops, management practices, and inputs for a specific field in a given year.

Phytobiomes Vision for Agriculture



**Optimal
sustainability
and
productivity**

**Adaptive,
data-driven,
on-farm
systems**

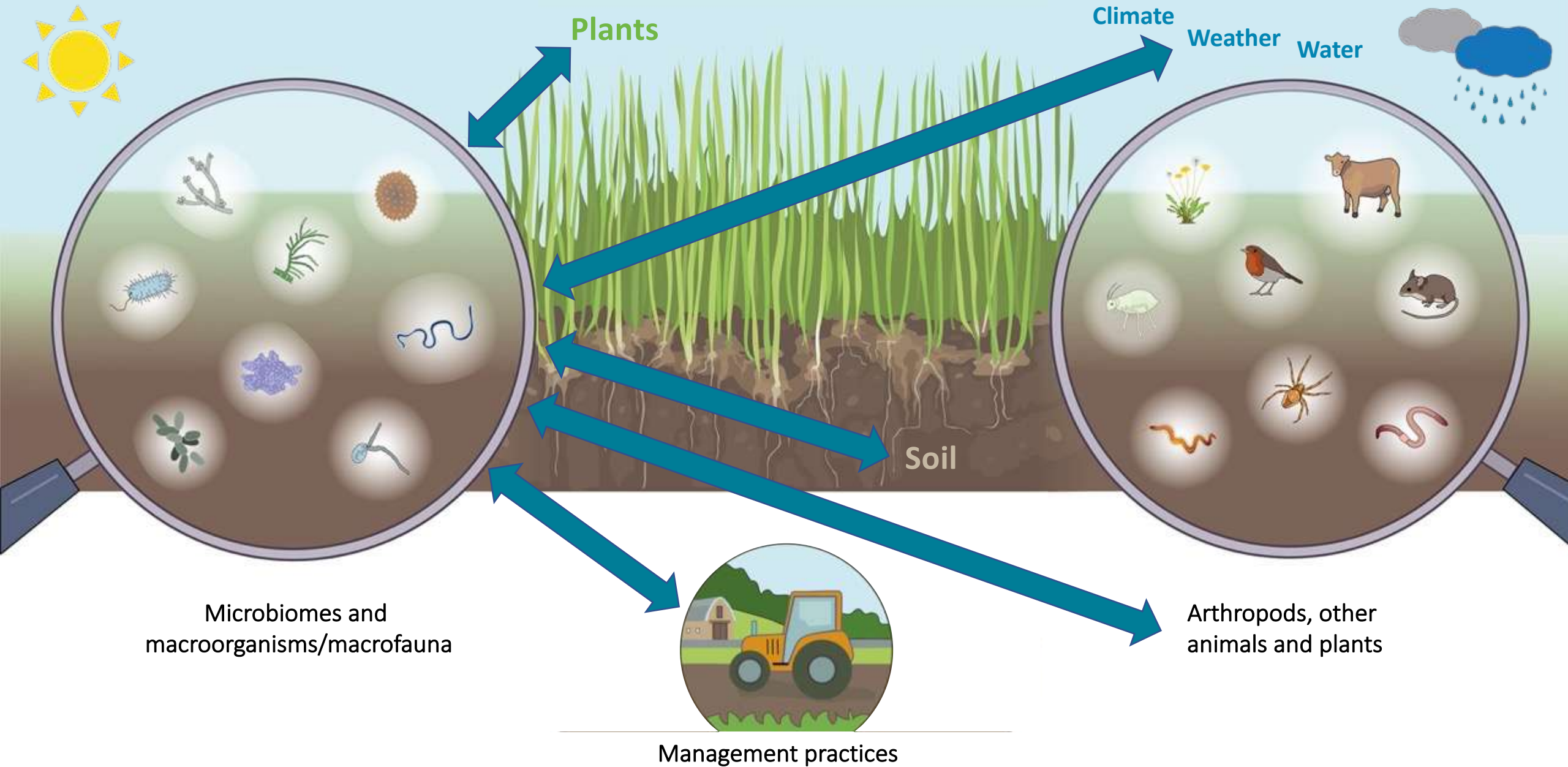
**Rapid site-
specific
diagnostic
tools**

**Prescriptive
crop
management
techniques**

**Resilient
crops**

**Optimized
soil health**

Phytobiomes: Major Research Gaps



Research Priorities



Microbiome-knowledge generation



Standards and protocols



Regulatory framework



Data generation & management



Multi-disciplinary capacity building



Precision/digital Ag integration

Major Efforts



Projects that Link Components Within the Entire Phytobiomes Network



Sequence-based Classification System for Microbes



Microbiome Standards – International Microbiome & Multi'omics Standards Alliance



Facilitate Regulatory Compliance



Coordination of Microbial Collections and Networks: Public & Private



Establish Linkages with Human and Animal Health & Nutrition

Alliance Working Groups



Controlled Environment Agriculture



Regulatory



Microbiomes



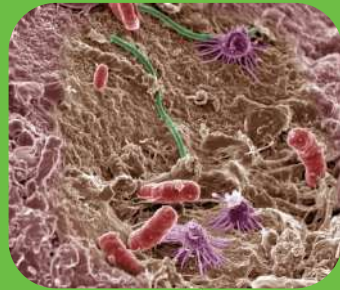
Livestock & Poultry Microbiomes

Why Now?

Technological advances in

Probing & understanding biological components

- Genome enabled technologies



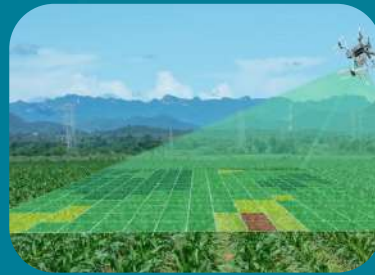
Computational science

- Machine learning
- Quantum computing
- Deep learning



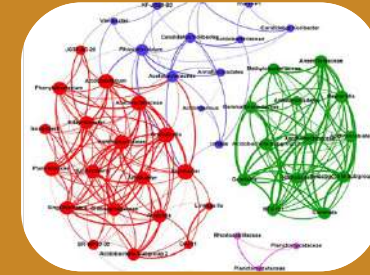
Precision crop management systems

- Variable rate technology
- Unmanned Aerial Systems
- Soil, plant & weather sensors
- Robots



Systems science

- Network analysis



Convergence of need & opportunity

Phytobiomes Conference 2022



**Registration & Abstract
submission are open**

Key deadlines

- **24 June 2022** – Abstracts for oral presentations, poster flash talks and Early Career Awards
- **24 June 2022** – Early bird registration closes
- **15 July 2022** – Abstracts for posters
- **9 September 2022** – Registration closes

13-15 September 2022 | Denver, CO, USA

www.phytobiomesconference.org

The 2022 International Phytobiomes Conference is supported by the Agriculture and Food Research Initiative grant no. 2021-67017-35265/project accession no. 1026155 from the USDA National Institute of Food and Agriculture.



National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

The 2022 International Phytobiomes Conference is supported by the National Science Foundation under Grant No. 2211046



Hands-on Workshop



Metagenomics and Microbial Sequencing for Diagnostics

1:30 - 4:30 pm

Registration needed

www.phytobiomesconference.org

12 SEPTEMBER 2022 | DENVER, CO, USA

Phytobiomes Conference 2022
www.phytobiomesconference.org

Convening Event



Identifying Gaps in Phytobiomes Research

FREE - Open to all International Phytobiomes
Conference attendees - RSVP needed



FFAR



16 SEPTEMBER 2022 | DENVER, CO, USA

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Thank you for listening

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