Phytobiomes:
A New Vision for Agriculture

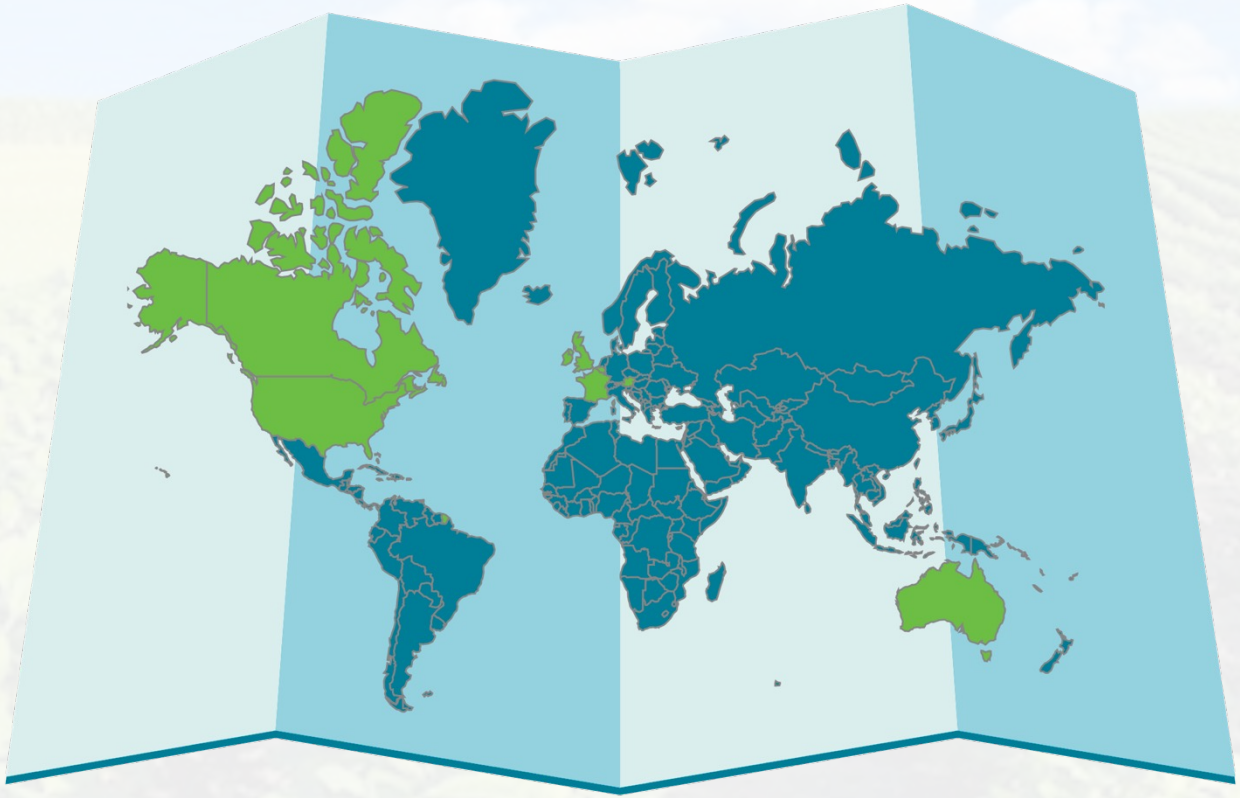
PHYTOBIOMES ALLIANCE

Name

Date

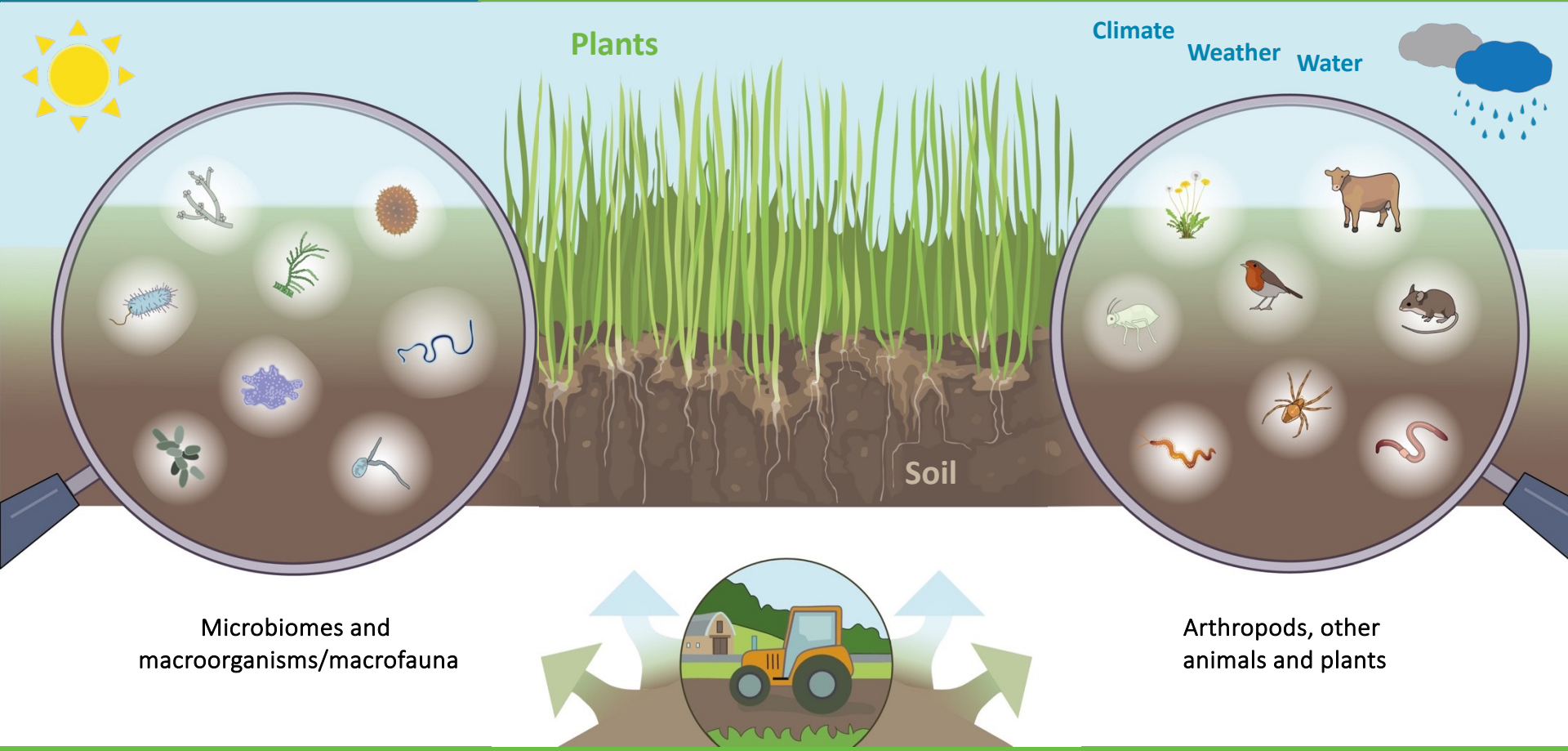
Conference & City Country

International Alliance for Phytobiomes Research



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

Phytobiomes: Complex Systems of Plant-based Agriculture



Microbiomes and macroorganisms/macrofauna

Arthropods, other animals and plants

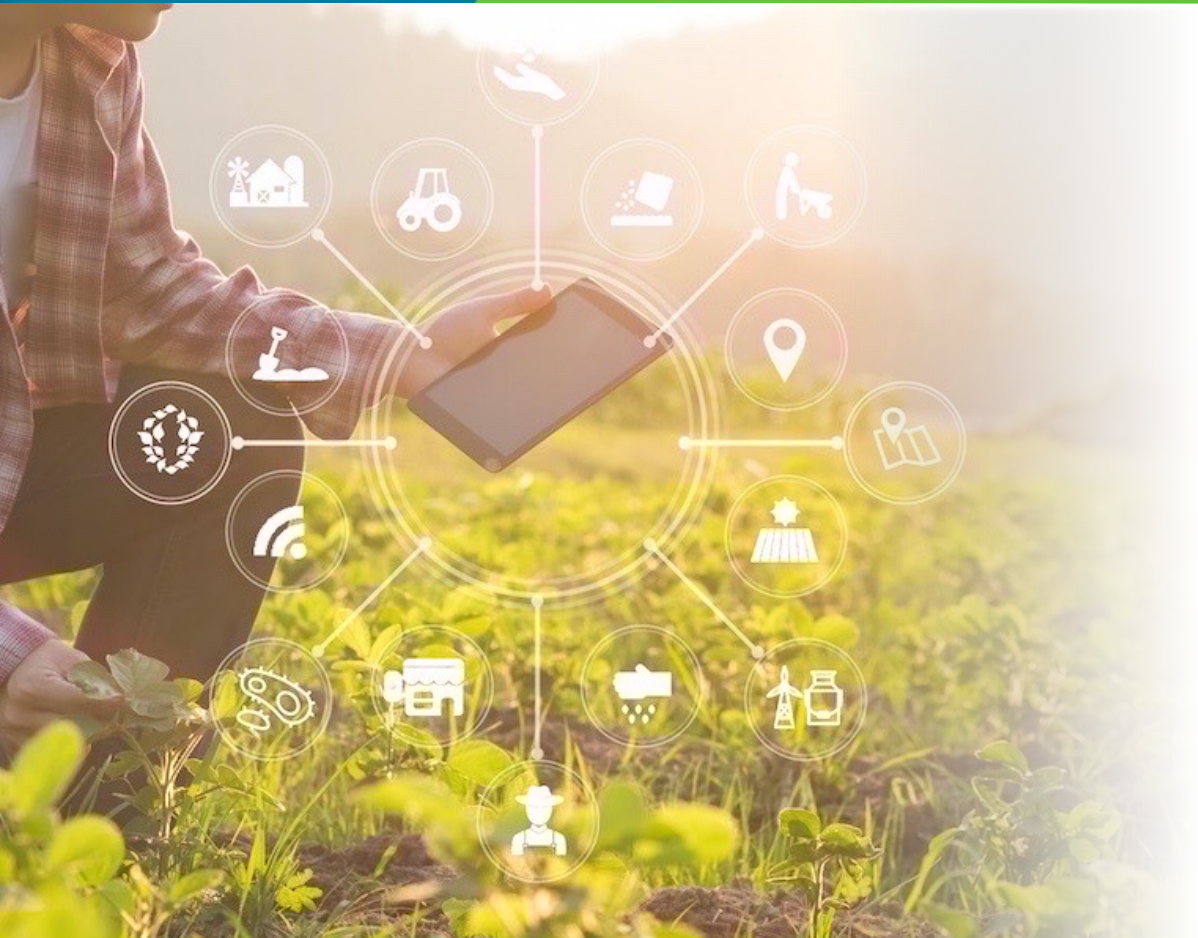
All influenced by management practices

Examples of Phytobiomes

Holy Grail for Phytobiomics

To understand, predict, and control emergent phenotypes within specific phytobiomes for the sustainable production of food, feed, and fiber.

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

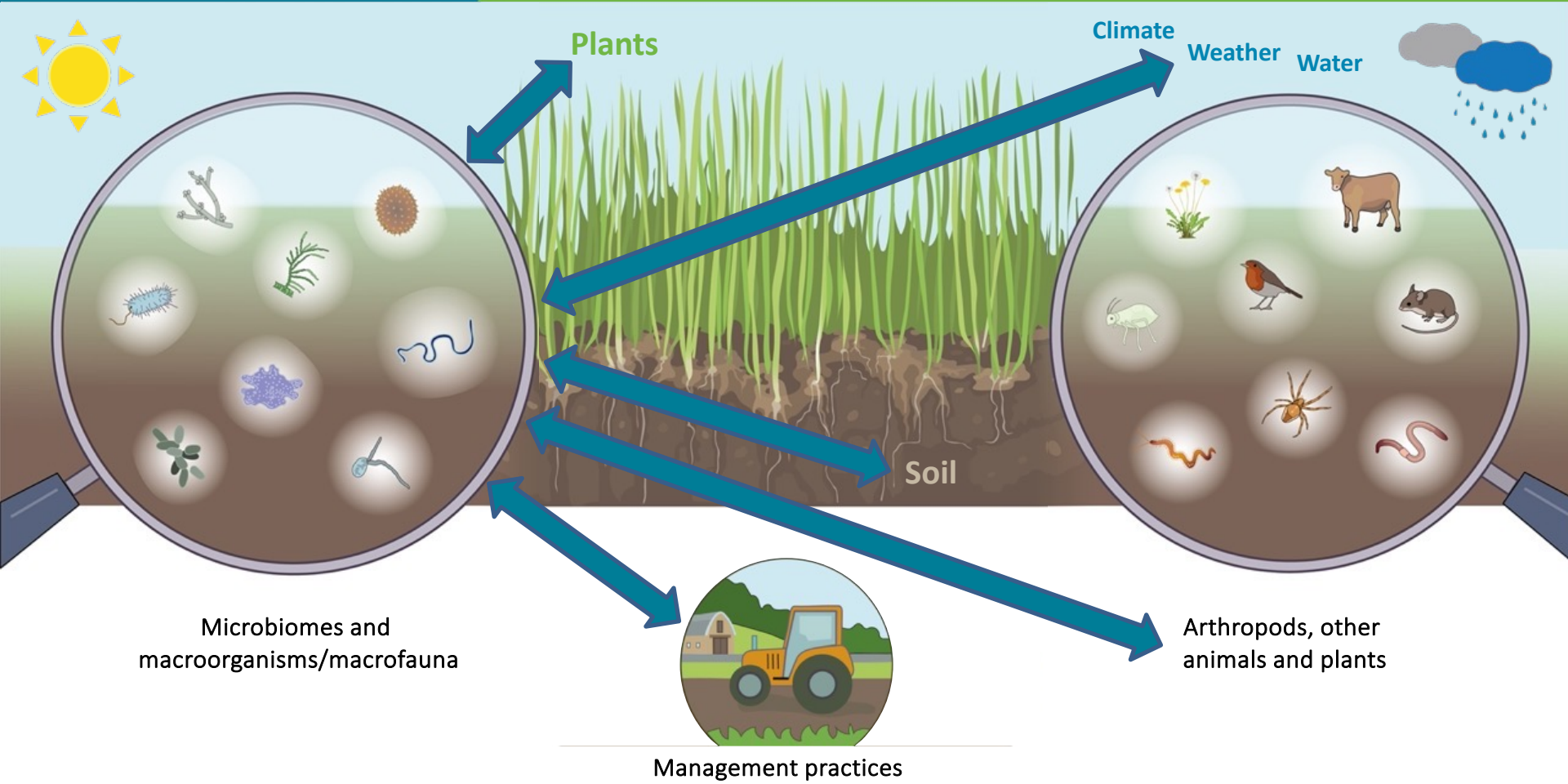
Rapid site-specific diagnostic tools

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

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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

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Phytobiomes Alliance Working Groups

Lead and coordinate efforts on specific topics

- Soil Health (currently being organized)
- Microbiomes
- Regulatory
- Animal Microbiomes
- Controlled Environment Agriculture

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Why Now?

Technological advances in

Probing & understanding biological components

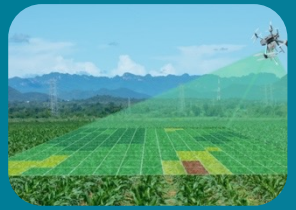
- Genome enabled technologies

Computational science

- Machine learning
- Quantum computing
- Deep learning

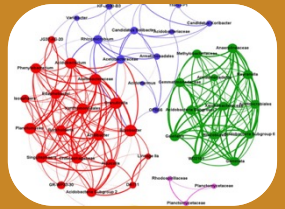
Precision crop management systems

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



Systems science

- Network analysis



Convergence of need & opportunity

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Phytobiomes Conference 2024

8-10 October 2024

St. Louis, MO, USA

www.phytobiomesconference.org

Main Scientific topics

- Climate/weather
- Environmental Data Set
- Plant fitness
- Microbial community assembly and function
- Network analyses within the phytobiome system
- Modeling
- Data – framework, tools and resources, big data
- Genetic linkages
- Carbon sequestration
- Interactions within phytobiomes for abiotic stress
- Engineering microbes and microbial communities
- Precision agriculture/digital Ag
- Fertilizer, nutrient, and chemical input efficiency
- Product development
- Regulatory requirements
- Greenhouse & Field trials
- Industry research needs

Phytobiomes Alliance Sponsors

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