

Advancing a Phytobiomes Vision of Agriculture

{ phytobiomes vision }

Background: Phytobiomes are plants, their environment, and their associated communities of micro- and macroorganisms. *Phytobiomes: A roadmap for research and translation* is a strategic plan that details how sustainable crop productivity can be achieved through a systems-level understanding of phytobiomes. In 2016, APS led the development of this strategic plan to advance a new vision for agriculture. ***This vision is that knowledge of phytobiomes will be used to maximize sustainable food, feed, and fiber production.*** To help integrate the many disciplines that are critical to a comprehensive understanding of phytobiomes, APS launched the new open-access, transdisciplinary *Phytobiomes Journal* in 2016.



Advancing a phytobiomes vision of agriculture requires significant advances in our knowledge of the drivers of healthy, resilient phytobiomes. *It also requires a commensurate focus on translating this knowledge into agricultural applications.* For example, microbiomes, an especially underexplored component of phytobiomes, are increasingly recognized for their powerful roles in sustaining the health of cropping, rangeland and forest systems. The amenability of microbe-based management strategies to commercialization and incorporation into cultural practices by growers illustrate a high potential for industry-academic partnerships and a critical role for extension and applied agriculture activities in achieving the phytobiomes vision.

Key Needs: Improve phytobiomes knowledge and apply this knowledge to achieve sustained productivity of our cropping systems through increased funding opportunities for:

- Fundamental research that identifies rules of phytobiome assembly, dynamics, and resilience using complementary approaches of large-scale projects focused on core crops and small-scale projects exploring diverse cropping, rangeland and forest systems
- Nanotechnologies and *in situ* sensors to characterize microclimates and understand phytobiome interactions across diverse spatial scales
- Translational research that identifies and exploits beneficial interactions within phytobiomes to increase the profitability and sustainability of crop production, food safety and quality, and the restoration of damaged or degraded croplands, rangelands and forests
- Infrastructure in the form of long-term support for community resources for interpreting phytobiome data, including open-access, curated databases and curated microbial culture collections

Phytobiomes Mission

Enhance sustainable food, feed, and fiber production using phytobiome-based approaches

- Explore individual phytobiome components and their interactions
- Integrate phytobiome systems-based knowledge, resources, and tools
- Optimize phytobiome-based site-appropriate solutions
- Apply phytobiome-based solutions in next-generation precision agriculture
- Educate and engage scientists and society

Contacts: APS PPB member **Gwyn Beattie** (gbeattie@iastate.edu) and APS Consultant **Kellye Eversole** (eversole@eversoleassociates.com) are available to answer any additional questions.