

KN

Setting the Stage for a Phytobiomes Approach to Drive Sustainable Agricultural Production

Kellye Eversole

International Alliance for Phytobiomes Research, Eau Claire, WI, USA. Eversole Associates, Arlington, MA, USA

Abstract

To meet the demands of a global human population expected to exceed 9.6 billion by 2055, crop productivity must improve considerably in the face of a steadily changing climate that presents increased biotic and abiotic stressors. Traditional agricultural sciences have relied mostly on research within individual disciplines and linear, reductionist approaches for crop improvement, production methods, and practices. While advancements have been made in developing and characterizing crop genetics and genomics, the soil characteristics, and beneficial microbe-plant interactions, we have a limited understanding of the biome within which plants are grown and the complex geophysical and biological interactions that determine productivity, sustainability, quality, and resistance to stress. Embracing complexity and deciphering the nonlinear organization and regulation of biological systems will move us towards a systems level, phytobiomes approach. Phytobiome is the holistic concept of a plant growing in a specific biome and all of the interacting geophysical and biological components influencing the productivity or health of a plant. Integrating multi-disciplinary knowledge of all aspects of the phytobiome will enable us to identify meaningful interactions between system actors and provide opportunities to elucidate, quantify, model, predict, modify, and ultimately prescribe the cropping systems, methods, and management practices most suited for a particular farm, pasture, grassland, or forest. This presentation will provide an overview of recent progress in the phytobiomes approach, and propose a path towards more transdisciplinary research programs which will provide growers, farmers, ranchers, and foresters with novel integrative tools and resources aimed at optimizing their productivity, sustainability, and profitability.

