m-CAFÉs Development of novel CRISPR-Cas technologies for precise manipulation of microbial networks

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Project Goals: To derive mechanistic understandings of plant-microbe-soil interactions using reproducible, simplified ecosystems

The m-CAFÉs program is a collaborative, coordinated and integrated, mission-driven program to interrogate the function of soil microbiomes with critical implications for carbon cycling and sequestration, nutrient availability and plant productivity in natural and managed ecosystems. As part of this effort, we aim to interrogate the importance and function of individual microorganisms in synthetic and natural microbiomes within realistic, fabricated ecosystems (EcoFABs). However, the technologies to enable this precise manipulation of single species within a complex community environment are currently lacking. Therefore, a major goal of the m-CAFÉs program is to pioneer the development of CRISPR-Cas soil microbiome editing to uncover the functions of cultivated and uncultivated microorganisms. This powerful new platform will provide the fundamental genetic basis for the formation and functional importance of microbial metabolic interaction networks in soil. Here, we present some of our preliminary studies as well as a roadmap for the development of this approach including strategies for delivery and precise microbial targeting and ablation.

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