Engineering Plants with Novel Metabolic Pathways as a Production Platform for Bioproducts

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**Project Goals:** To engineer bioenergy crops with improved biomass and sustainability traits.

Metabolic engineering of plant pathways poses a great challenge due to limited understanding in plant metabolism and bioengineering approaches that can be applied in plant biology. Howbeit, genetic engineering in plants has gained many interests in recent years as an alternative to create sustainable resources opposed to their microbial counterparts, like yeast and bacteria. In planta, only a small percentage of biosynthetic pathways are known and, by the same token, remain a pool of untapped resources and machinery to synthesize complex metabolites. As such, we explore the potential of using plant-based production of the chemical, muconic acid (MA), an intermediate molecule that can be derived into several bioplastics. However, existing biological approaches are mostly focused on producing MA from a glucose feedstock in microbes. Here, we exploit plant primary metabolism to test and optimize various metabolic routes, enabling direct production of MA via photosynthesis. Plant-based metabolic engineering efforts may enable a more sustainable means of producing chemicals of interest and decrease our dependence on current practices that are heavily dependent on petroleum feedstocks.

**References**