Title: Accelerating the Development of Tailored Perennial Feedstocks for Sustainable Bioenergy and Bioproducts

Kankshita Swaminathan

C4 perennial grasses, such as *Miscanthus*, offer a promising and sustainable source of lignocellulosic biomass. These grasses efficiently recycle essential nutrients like nitrogen across multiple growing seasons by storing them in rhizomes during dormancy, leaving dry stems that can be harvested annually. Despite growing interest in *Miscanthus* as a crop, the availability of commercially grown cultivars is limited. The few cultivars currently in use are sterile triploid hybrids, necessitating clonal propagation and hindering further genetic improvement. Our goal is to expedite the development of *Miscanthus* cultivars with specific traits optimized for use in sustainable aviation fuel, biomaterials, and bioproducts. Achieving this goal requires extensive genetic and genomic resources. To address this need, our team, comprising collaborators from multiple institutions, has established a comprehensive germplasm collection representing the major genetic groups of *Miscanthus*. We are generating essential genomic data to facilitate the breeding and selection of new lines. However, the breeding process is complex and time-consuming due to *Miscanthus's* polyploid nature and its requirement for outcrossing. To complement these breeding efforts and accelerate the domestication of this high-biomass grass, we have developed transformation and gene-editing protocols for *Miscanthus*. These protocols will enable the creation of new lines with advantageous novel traits for breeding and allow for the engineering of metabolic pathways to produce high-value bioproducts. Additionally, this technology can improve current commercial cultivars as well as promising parental genotypes for new hybrids. A summary of these efforts will be presented.

Hello Kankshita,

I hope, like me, you enjoyed the get-together this week for the Engine. I think it was needed and very beneficial to the entire team.

On another note, we are in the final stage of the organization of FIB and need your abstract to finalize the program. Could you please send it to me by the end of the week?

Thank you very much,

Niki