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Abstract Title: Comparison of two *Panicum* mesophyll protoplast isolation and transformation systems

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Abstract (250 words or less): *Panicum virgatum* (switchgrass) is an important dedicated bioenergy feedstock for reducing U.S. dependence on foreign oil. To make switchgrass an economically viable biofuel source, genetic engineering is necessary to generate transgenic switchgrass with advantageous traits, including lower cell wall recalcitrance. However, screening of transgenics is a long and arduous process that can take years to finish. For the broad adoption of switchgrass as a biofuel crop, a system must be developed that can rapidly screen transgenic switchgrass to determine positive phenotypes. To meet this need, in this work, *Panicum hallii* (PAH) was used to develop a C4 model for switchgrass, specifically for screening promoters and genes. To achieve this goal, methods were developed for low-cost isolation, transformation, and screening of protoplasts from both *P. virgatum* and *P. hallii*. Despite the smaller stature of *P. hallii*, the yield of protoplasts per milligram of tissue was higher for *P. hallii* than *P. virgatum*, with the low-cost enzymes performing better than traditional enzymes. Similarly, the transformation efficiency of *P. hallii* was superior to *P. virgatum*, which further validates the potential of *P. hallii* as a C4 model. Finally, using the pANIC10A vector developed for *P. virgatum*, *P. hallii* showed similar expression levels for the fluorescent reporter. Further studies are necessary to determine if the utility of *P. hallii* as a C4 model for assessing whole plant phenotypes, however, this project offers a first step toward using PAH as a model system for transgene and promoter screening in *Panicum* species, including switchgrass.